

The AUTOMOBILE

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"Even if Your Motor Were Just as Good as the Continental"

Even then, it would pay us to choose the Continental."

That is the wise decision to which many a manufacturer of automobiles and trucks has come. Their engineers have designed motors that on paper appear "just as good as the Continental;" sometimes they have even manufactured these for a while. Then comes the realization that *it pays to choose the Continental.*

Why? Because the Continental Motor is not based upon the fancy or inspiration of any one engineer, but embodies all the best engineering knowledge of this generation. Because, too, it possesses the unqualified confidence of the 15,000 dealers and sub-agents who sell Continental-powered cars. Because, finally, the motor-buying public has learned by experience that the Continental Motor affords them a certainty, not a hope. For these reasons the Continental Motor is the choice of over 150 manufacturers of motor cars and trucks.

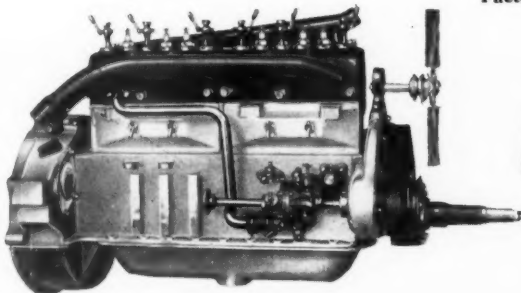
It pays to choose the Continental.

CONTINENTAL MOTORS COMPANY

Factories: Detroit—Muskegon

DETROIT, MICHIGAN

Largest exclusive motor manufacturers in the world



Continental Motors

Stewart
Motor Driven Tire Pump



\$12

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It looks as if 1917 was going to be a "complete equipment" year in the real sense of the word.

We judge this from the large quantity of Stewart Tire Pumps which have been and continue to be ordered.

Only a few days ago we booked

the largest single order ever placed for pumps.

Each week our pump business grows larger and larger.

The survival of the fittest is the explanation.

If you want the best pump—get the Stewart.

"No car is better than its accessories"

The Stewart-Warner Speedometer Corporation, Chicago, Illinois, U. S. A.



A few of the many thousands of automobiles wrecked in war. All of these machines are capable of being repaired

Rejuvenating Wrecked Cars

French General Clearing Hospital Behind Lines
Utilizes Every Part for Practical Purposes

By W. F. Bradley

"THERE must be a tremendous amount of automobile junk piling up behind the armies in France."

Doubtless this is a surmise shared by many who have reflected vaguely on the destructiveness of war, but have had no opportunity of examining the methods employed to repair the inevitable loss of equipment.

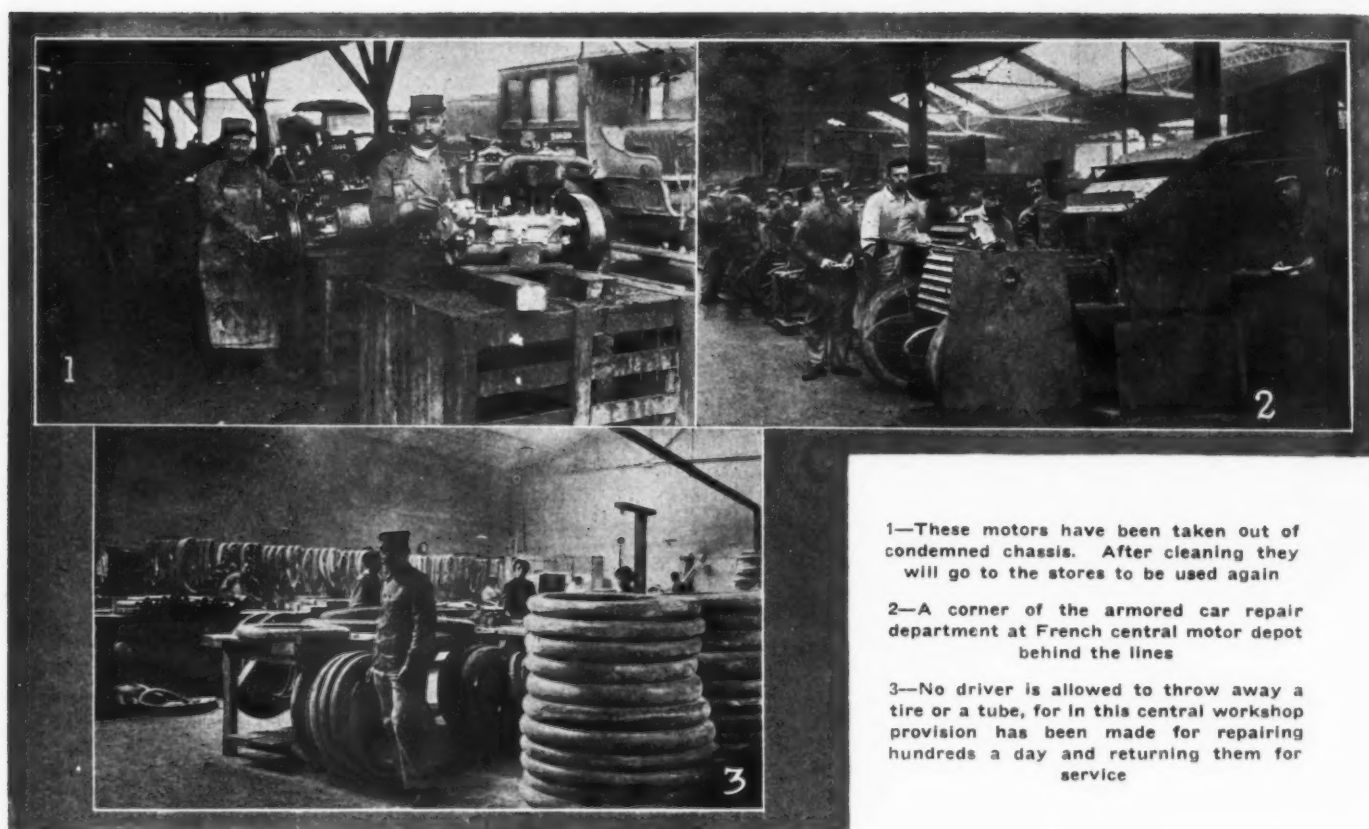
This opportunity to examine the methods adopted in order to prevent the wastage of automobile material and keep the mechanical transportation service of the army working on the most economical lines came with an invitation of the French War Department to visit its huge centralized repair depot. First aid in automobile breakdowns is

given by the traveling workshops attached to each convoy or group. More serious cases are dealt with by the general repair shop—a few miles behind the lines. The

first-aid gang can deal with only a limited amount of work of a comparatively simple nature. Theoretically the army workshop can tackle any kind of a job; but when these shops have to be established in barns, under canvas covers on some market place; when they are in danger of being shelled by the enemy, and when they are obliged to maintain a certain degree of mobility, they are apt to be submerged and incapable of carrying out the work entrusted to them either rapidly or economically.



A collection of radiators from all factories



1—These motors have been taken out of condemned chassis. After cleaning they will go to the stores to be used again

2—A corner of the armored car repair department at French central motor depot behind the lines

3—No driver is allowed to throw away a tire or a tube, for in this central workshop provision has been made for repairing hundreds a day and returning them for service

Thus, back of the army workshops the French War Department has established its general clearing hospital. This unique establishment receives the whole of the overflow from the repair shops in the field. Cars and trucks which have been battered by shell fire, vehicles which can no longer be efficiently kept in repair, old models for which spare parts are not easily obtainable, the whole of the automobile wreckage of the battlefields, flows into this central establishment. This organization may be compared to the big hospitals which receive all the human wreckage of warfare. The automobile hospital, however, does not admit of a crematorium in the background, for under the wonderfully efficient system evolved by the French no vehicle, nor any wreckage of a vehicle, can ever be considered valueless.

80,000 Vehicles at Front

Along the French front there may be some 80,000 automobiles of all kinds. This figure does not claim to be accurate, but it is sufficiently near the truth to give an impression of the vast organization dealt with. The overflow and the hopelessly incurables from this vast army are brought in by rail to the central repair depot at the rate of about seventy or eighty per week, and about 60 per cent of these are capable of being rebuilt into perfect automobiles fit for service in the fields.

When this organization was decided on the war had already been in progress a considerable period and there had accumulated several thousand battered remains of motor vehicles of all makes, from all countries, of all ages—having only one feature in common, their inability to run. The law of the survival of the fittest decreed that these first wrecks should be the least valuable of the automobiles of France. They comprised old models which had been doing useful if not very efficient work in various corners of France when the net of the requisition agent swept them up; they were thrown pell-mell into the army, and the army a few months later threw out their cracked and rusty bones.

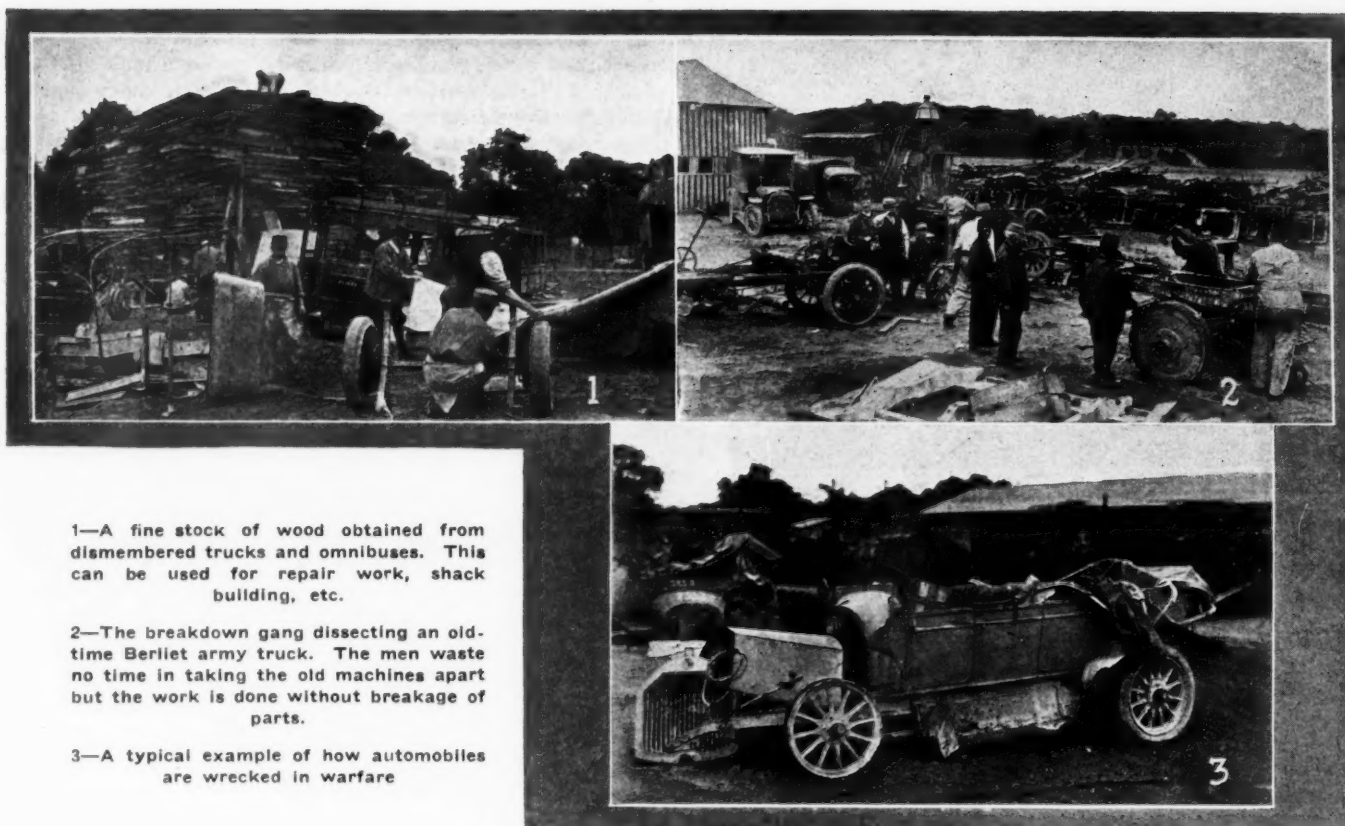
The officers placed in charge of the central repair depot had to decide what should be done with this old-world wreck-

age and also with the more modern material which came in from day to day with only slightly varying regularity. It is an invariable rule in the French automobile service that no war-worn cars shall be thrown on the market and that not an ounce of metal nor a plank of wood shall pass into civilian hands. This rule has been strictly adhered to and will continue to be adhered to, to the disappointment of those bargain hunters who are hoping to secure war-worn vehicles for an old song and to the foiling of the man who habitually presides over the junk heap. Speculators can make no money out of this branch of the French army.

Automobile Dissection as an Art

As each batch of wrecked vehicles comes in, a group of expert officers examines them and decides whether the vehicle shall undergo repairs or whether it shall be dismembered. In the former case it is towed or carried away to the repair shops to be dealt with in a manner which will be described later. If dismemberment is the order, the vehicle goes into the temporary cemetery and is dealt with in proper order. These French officers have developed automobile dissection into a fine art; there is not an ounce of material on an automobile which is incapable of being used in some efficient manner. First of all the carburetor and magneto—if these two auxiliaries still remain—are taken off and sent to the stores. A special gang strips off the body, and while one man puts the horsehair into a sack another takes the cloth or the leather, another rips off the sheet metal panels and still another pounces on all the woodwork. The man who is interested in seat stuffings knows the difference between horsehair and the many substitutes which pass under that general term—and he has a special sack for the real thing and another receptacle for the imitation. The same with upholstery and leathers. Real leather from a \$3,000 touring car is not stored with the imitation from a \$500 runabout. It takes no longer to classify them than to group them, and the saving on quantities is enormous.

The same system applies to the chassis. When the motor is taken out of the frame it is carried across to the cleaning



1—A fine stock of wood obtained from dismembered trucks and omnibuses. This can be used for repair work, shack building, etc.

2—The breakdown gang dissecting an old-time Berliet army truck. The men waste no time in taking the old machines apart but the work is done without breakage of parts.

3—A typical example of how automobiles are wrecked in warfare

shops. It may be found that this unit is in perfect condition, in which case it is cleaned and sent to the stores. It may be that the wreckage is so complete only one connecting-rod can go into service again, in which case that single rod goes into the stores. The gearbox, the rear axle, the steering mechanism, the brakes, all pass under the same examination. If a gearbox, for instance, is unfit for further service, it is not thrown into the junk heap and allowed to lie there. Its shafts are taken out, its ball bearings are separated, its gears, if of B. N. D., or other high-grade steel, are not thrown into the heap with cheap mild steels; the aluminum casting is not flung in with the cast iron.

A Card Index System

The card index system has been applied to this work in a very systematic manner. When a vehicle comes in it is given a number and classified according to its make, model, and year. All the parts saved out of this vehicle and sent to the stores for possible future service are noted on the back of the card. These parts vary considerably: they may be a complete motor, a complete transmission, a complete rear axle, or only a crankshaft, a set of connecting-rods, or a couple of cylinders. But whatever they may be, they are recorded.

How the System Works

As an example of how this system works, let us suppose the repair depot receives a Peugeot XZ model, 1912 type in good condition with the exception of a big hole in the cylinder waterjacket. The officer in charge of records looks up his dockets of Peugeot XZ 1912 models and finds that he has in the storehouse a set of cylinders saved from a previous wreck. He makes out an order for these to be delivered to the repair shop and records their departure from the stores. From time to time repairs will be given out to the factory having originally built the car, and it is the army which will provide the replacements to be used in that car. As European factories are generally working on munitions, the factory stock of spare parts is often low, and in many cases it would be necessary to make parts specially but for this com-

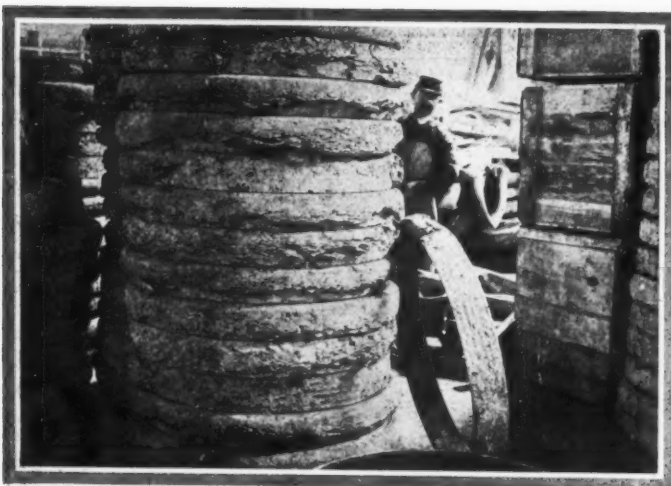
plete system of classifying all parts taken out of condemned chassis. There are numerous cases also of old models still fit for service, but for which spares cannot be obtained owing to the factory being in the hands of the enemy, the firm having disappeared, or other causes. In these instances the army stock allows a good vehicle to be repaired. A particular instance noted during my visit was several Mercedes-Daimler trucks captured from the enemy or picked up on the battlefield. Several of these had been put into service entirely owing to the fact that spares had been secured from disassembled Mercedes-Daimlers. It is estimated that the French army is saving \$5,000 a day on its spare parts bill alone by reason of the intelligent application of this system.

1000 War-Worn Cars

The big open-air garage in which considerably more than 1000 war-worn cars are awaiting treatment is one of the most picturesque sights in connection with the war. There is such a variety that it needs a life-long connection with the automobile industry of two continents to identify them without reference to the maker's nameplate. Every possible cause has helped to bring them to this common meeting place. Some are merely worn out from hard service; there are cases of collision, fire, water, high explosive shells, machine gun and rifle fire. A modern-looking gray Panhard limousine appeared to have little the matter with it—its tires were intact and its body carried only the scratches which come of hard service. But when the rear door was opened a silent tragedy was revealed, for a shell had burst inside and the blood of brave men had dried on the floor and seats of that once elegant limousine.

No Young Men

All the men connected with this depot are beyond the fighting age. The only one who could lay claim to youthfulness was the officer who had evolved the card index system. For years before the war he had been a salesman in Paris and London automobile showrooms and had been selected for this post on account of his organizing ability and his intimate



How rubber tires are received from the front

knowledge of the features of all makes of cars. In the various departments were to be found engineers, foremen and testers from the leading French automobile factories—men whose age or constitution would not allow them to undertake the rough work of the trenches, but who were capable of an honest day's labor.

Everywhere Economy

The system of economy was spread to the tools with which the men worked. Tubular chassis built by Renault about 1900, constituted excellent floats for moving material about the yard when stripped of all their organs but the steering gear. Wheelbarrows with a ball-bearing motorcycle wheel and a body made out of a truck's side panels cost practically nothing to produce and were more satisfactory than the usual article delivered by the stores. The rough sheds which serve as offices and will have to be pulled down when the war is over, had windows taken from derelict hotel omnibuses. Chain-driven truck rear axles and springs, of which scores could be saved from the wreckage, were almost ideal for field kitchens.

A Central Repair Shop

With this system in proper working order, a considerable amount of material is accumulated which cannot be used again in the rebuilding of automobiles. These comprise stocks of aluminum, copper, brass, sheet steel, high-grade steels, mild steel, etc., all of which are sold to the foundries working exclusively for the war department. The state monopolizes metals and eliminates private speculation.

In conjunction with the central receiving and dissecting

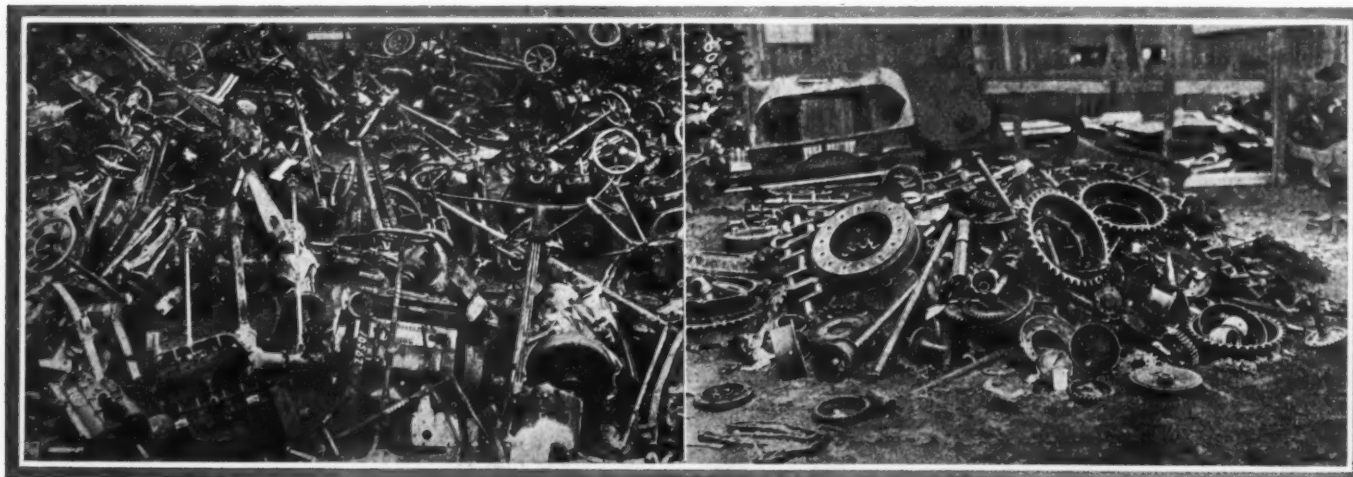
department is a central repair shop. When this work was begun the repair shop officers were given a wholesale wine merchant's storehouses and yards and told to make the best of it. Within a few months those empty buildings and deserted yards had been transformed into well-equipped shops filled with all kinds of automobiles undergoing or waiting repair. Technically this central repair department only differs from civilian repairshops by reason of its size and the variety of work undertaken. Thus, in addition to the usual divisions dealing with motors, gearsets, rear axles, etc., each of these is sub-divided according to makes. Men who have had experience of American motors, for instance, being kept on that class of work as much as possible, while Knight motor specialists are kept busy on sleeve-valve engines. The range of work covers everything from a heavy 60-hp. four-wheel-drive tractor to a light-weight motorcycle, while the individual repairs may be the changing of a steering gear or the complete reconstruction of chassis and body. Under such conditions a cast iron system is not possible of application, yet the general arrangement is wonderfully orderly and economical. At one end of the building the chassis are dismounted and frame, sheet metal and radiator repairs are carried out. The various units are passed into the engine, gearbox and rear axle departments and assembly carried out on the usual factory lines. Spares are obtainable from the stock of dismembered cars, by an order on the central supply stores, from the home factory, or in exceptional cases the parts may be made in the shops.

Road-Test Department

The road test department is similar to that of the big factories, for every chassis after assembly must go on the road to be passed by the tester. The authorities have at their disposal a remarkably good class of men for this work: several racing mechanics who had been through the whole series of Gordon Bennett events were noted among them, and the officers pointed out testers from such factories as Brasier, Panhard, and Delaunay-Belleville. After the road tests the chassis pass to the body shops, where they are completed, given a final road test, and then returned to the receiving yard from which they are redistributed to the army as required.

Repairing Tires

In the early stages of the war tire economy was considered a matter of no importance. Drivers of touring cars, having neither time nor means of repair, left their punctured tubes and casings by the roadside, and put in a claim for new ones, which claim was never refused. Now all that is changed. Every worn casing and every punctured tube must be returned to the depot from which the driver works. This depot



Left—This may look like junk, but every unit has been passed for service after cleaning and slight repairs. Right—Only high-grade steels are allowed to enter this group

sends its damaged tires to the central repair department, and here, in a specially equipped shop, tubes and casings are made almost as good as new. Repaired and tested tubes are packed in boxes marked in big figures with their dimensions, and repaired casings are wrapped in the same way as new tires and labeled with maker's name and size. These repaired casings and tubes are given out to the army as required, the output after only a few months working of this department being several hundred a day.

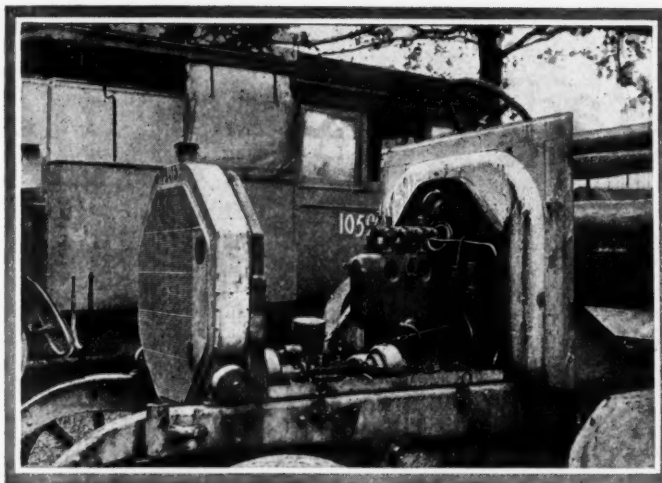
Presses for Truck Tires

A similar method has been adopted for truck tires. Hydraulic presses are maintained with all the armies on the front, and the staffs in charge of these presses periodically return all the worn-out bandages to the central repair depot. Here machinery has been erected for paring all the rubber from the metal base, this worn rubber being sold from time to time as sufficient stocks accumulate.

So complete and thorough is this system that instead of wreckage being piled up, the automobiles of France are being rejuvenated and the end of the war will find that country with a smaller proportion of old-timers than it possessed at the outbreak of hostilities. Month after month the least valuable trucks and cars are disassembled and their parts sent to the melting pot. Old vehicles which might be good enough for individual service over well-paved city streets are of no use to the army and consequently are not allowed to exist. Only thoroughly sound automobiles are of any value in warfare. It is possible to state that, so far as France is concerned, the end of the war will find the country with a better and more modern automobile fleet than the beginning. Further, this change will have been made without loss to the nation.

Mobile Repair Shops

The mobile repair shops, which have already been described in *THE AUTOMOBILE* on previous occasions, have been found very valuable for quick repair work of all kinds, one of their special advantages being that they can be moved to any new position within an hour after an order has been received to the effect that such a change is necessary. Each tool is mounted on a special trailer truck and two or three of these trailers are made up into a train drawn by an automobile or a motor truck and this arrangement gives the shops a wide range of action. While they have to be capable of keeping pace with the body of the main army whenever an advance or retreat is under way, these shops do not have to operate absolutely in the open. In fact, they have been found most effective for all-around work when operated at an average distance of 25 miles from the front and at this range it is generally possible to find buildings of a type which can be

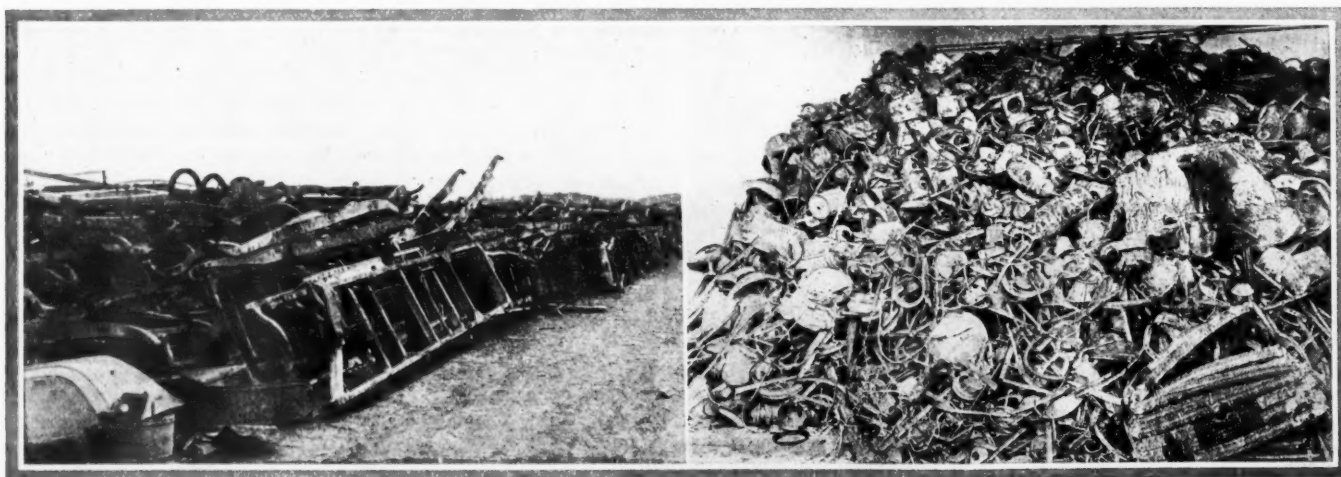


A captured Mercedes-Daimler truck which will return to the front when it has received a couple of cylinders and a piston

readily converted for repair shop purposes. Abandoned factories, street car stations, barns or a farmhouse with a large courtyard are found very convenient for the establishment of repair depots. In fact, such extremes as a village schoolhouse and a slaughter house have been selected as places suitable for this sort of work, while a factory with electric power is looked upon as ideal.

The equipment of the automobile repair shops usually comprises lathes, drilling machines, grinding machines, a case-hardening plant, and all the smaller tools required for general repair work. Electricity is used for driving the machinery, a gasoline engine and dynamo carried on a trailer being provided for this purpose.

There is more repair work to handle under war conditions as found on the frontier in the north of France than is the case in civil service. But on some parts of the front the percentage of scrapped automobiles and trucks is only slightly higher than in times of peace. The more dangerous conditions, however, and the fact that drivers cannot be selected with as great care in such circumstances, go a long way toward making up the increase in repair work over normal conditions which is found at the shops. Still, it is surprising how hard it is to put a motor vehicle entirely out of running order by bullet and shell fire. The bodies of the machines are frequently wrecked by shells, but it requires a direct hit or very heavy shell fire to render a chassis unfit for further service. It is a simple matter to replace the body work and even trucks which have been under direct fire to such an extent that they had to be abandoned have been towed to a repair shop and put into serviceable condition once more.



Left—These frame members are about to be sawn up and sent to the melting pot. Right—A collection of valuable junk which after going through the melting pot will be made into munitions

Radiator Design a Neglected Factor

Lack of Appreciation by Car Engineer Makes Difficulties for Radiator Manufacturer—Pros and Cons of Various Designs

ORDINARILY, when the car designer gets to the point of determining the size and type of radiator he wants to fit to the car, he gives the radiator maker the dimensions of the front end of the frame and car, indicates the shape desired and provides the radiator maker with such other data about the car and engine as will enable the latter to fix upon the amount of cooling area and general construction of the radiator. If the radiator maker is not able to give sufficient cooling with the limitations imposed, he usually comes back at the car designer and such alterations and changes are generally made as will allow of the proper size and cooling possibilities. Thus, as a general thing, the average car engineer pays little attention to the matter of radiators and depends upon the builder of that part for a proper type to suit his car.

One reason for this lack of consideration of the radiator problem by the car engineer is that each different make of radiator has some differences over every other type. Due to variations in the methods of making tubular and cellular cores, and to other differences in methods of building them up, it is hard to find any formula or data which will work satisfactorily for more than one make of radiator. Each radiator producer has determined through long experiment and test with his particular construction just what it will do per unit of area and thickness and, as this varies for each make, the car engineer could only design the radiator after determining which particular core construction he was going to use.

The Engineer's Part

It does seem, however, that the engineer should have a better understanding of the general radiator problem and of considerations that affect this all-important cooling member, for even though he does leave it to the producer of the radiator to determine the size and type to be fitted to meet the conditions, he could better design the parts that govern its size and shape to give greater opportunity to make it more efficient. Oftentimes some slight change in the front shape could be made to allow a much better radiator shape or size, and this usually could be done without in any way sacrificing the good looks or construction of the car in general. Perhaps the car designer might lay out the contour of the hood and body all unconscious of the fact that he was imposing some heavy limitations upon the radiator, whereas some slight differences in this would make a big difference in the radiator effectiveness if he but knew what they are.

For instance, the placing of the louvers in the sides of the hood and the position of these are important considerations. The width of the radiator, governed by the contour of body and hood, plays a part in the cooling efficiency. Whether or not there is a clear air passage back of the engine is another point influencing the cooling results. Others are the height of the car, the size of the engine, kind and type of ignition, carburetion, fan design and operation, fan location, water jackets of the engine, and a great many other things. Having more or less control over many of these, the car designer, as has been said, can always have an eye upon the health of the cooling system and the radiator if he knows what effect each has.

Take the question of louvers in the hood. It almost goes

without saying that the more there are the better the cooling, yet a great many cars have only a very few, while others have none at all. They do not detract from the appearance and therefore they should be used. Besides, these vents should be brought as high as possible on the sides of the hood so that no hot pockets can form at the top of the engine under the hood. The hot air goes up in the engine compartment just as it does in a room, hence vents in the part of the bonnet that is directly above the engine are an excellent thing, although very seldom found.

Price an Important Factor

The personal equation also enters into radiator design to a large extent in that what one man considers adequate cooling will not suit another. That is, the engineering department of one factory may be satisfied, for commercial reasons, with a radiator that will keep the water from boiling up to a certain point, although this same relative efficiency might not be at all satisfactory to another car builder who wished to have a more adequate cooling system. The price at which a car sells also has much to do with it, for the owner of a low-priced car does not object to the engine getting hot under conditions in which the driver of a higher-priced vehicle might think he had a right to expect the engine to keep reasonably cool.

As a general thing the popular high, narrow shape of radiator that is being fitted to a great many cars now is a more efficient shape than the older form with its greater width in proportion to height. One reason for this is the fact that a fan of moderate diameter extends the entire width of the core, cooling the entire flow of water as it passes down, as contrasted with the wider radiator which is too broad to allow the fan to extend its entire width unless the fan is of a diameter that in the average case would be too great to be accommodated in the space available. This is shown by the diagrams in Fig. 1. It will be seen that with the wide radiator at *B* some of the water at the sides does not get the effect of the fan, while at *A* all the water is given the benefit, although the fan is of the same size in both cases. Then, too, the high and narrow radiator gives a greater head and a greater distance for the water to pass from the top to the bottom, thus causing this water to be cooler when it again reaches the inlet pipe to the cylinder jackets.

In determining the type of radiator to use, the engineer is always confronted with the question of price. While it is generally accepted that the most efficient type of cooling unit on the market is the cellular radiator, nevertheless there are some very efficient tubular varieties whose builders claim almost as much cooling efficiency for them as for the cellular. The tubular core has a much smaller amount of seams that must be proof against water leakage than is the case with the cellular, but the tubular form is generally bulky. Being less costly than the cellular and in some forms giving an excellent account of itself, the tubular has seen wide use. Therefore, it is first necessary for the engineer to choose the type that presents the least number of possibilities for leakage with the best compromise with price and efficiency.

The thickness of the metal used in the core also has a bearing upon the efficiency, although for mechanical reasons it cannot be as thin as it should be for greatest radiation

quality. Generally speaking, the amount of heat radiated varies inversely with the metal thickness, this fact forcing the compromise just mentioned. Copper is the best metal to use in the core construction, but brass finds a very extensive place because of its being stronger so as to add to the mechanical rigidity of the built-up core. Where possible, however, in tubular types, copper tubes should be used in preference to any other. Some makers used copper in the forming of the cells of their cellular types with most excellent results. The use of any other metals in the radiator makeup should be discouraged due to chances for corrosion and rust. Some of the fittings are made of malleable iron in certain of the radiators on the market, but brass is better. If iron is used, it should be well tinned to prevent the destructive rust. Most good radiators have brass or copper tanks at top and bottom, also. Due to the unusual condition of brass being even more costly than copper at the present time, many radiators at the moment are being made with copper tanks instead of brass, but this is even better than brass, although under normal conditions it would be a more expensive construction. Copper is also easier to form, resulting in less wear on the dies.

There is some difference of opinion among radiator makers as to the advisability of making the core and shell separate, assembling them with bolts instead of soldering shell to core as an integral part. Some hold that the bolting of the core into a shell relieves the more delicate part of the strains that are set up by the frame, while others are of the view that such construction does not give as substantial a radiator unit, it after all being a question of solidly mounting the core so that vibration will not have a chance to work on the core.

Soldered-in Core Is More Rigid

There can be no doubt that the securely soldered-in core is more rigid as a whole, and that if the shell is of sufficient strength, any frame weaving will not have any very deleterious effect upon the core, but there is one strong point in favor of the separate shell. That is the matter of enamelling, for with the separate shell it is possible to give it as high a bake as is given any other metal part, this resulting in a more lasting enamel finish than can be obtained where the shell is integral with the core. In the latter construction the whole thing has to go in the baking oven, and the baking temperature must be kept down to prevent melting the solder. Ordinarily the solder will commence to melt at about 250 deg. Fahr., hence the baking temperature must be kept well below that amount to allow for any possibility of the temperature being higher in certain sections of the oven. This means that the enamel used has to be a low-baking variety, which is softer and not nearly so durable as that which is baked on at higher heat.

The matter of the size of the upper tank is an important consideration, more particularly where thermo-syphon cooling is employed. The depth of this tank for the pump-circulation system varies somewhat; with the average about 3 to 3½ in. so as to afford sufficient water to always keep the top of the tubes or cells covered. It being one of the requisites of a thermo-syphon radiator that there be sufficient head of water covering the tubes or cells, the tank in this case must be even larger, and they are usually extended back with considerable overhang to increase the quantity of water for the purpose. Tanks are frequently 5 in. deep, but there is a limit to the amount they can be allowed to extend back, due to the troubles in adequately supporting them, there being considerable weight when filled with water. Probably about 4 in. is the maximum amount they should extend back for good practice.

A well designed radiator core does not rely upon the solder to do more than act as an effective seal to the seams against water leakage. Solder is a very weak material and cannot be relied upon as a strength factor, hence the seams should be

so formed that they hold together firmly due to their inherent construction, the soldering merely being for the purpose of making watertight joints. Most modern radiators are built with this idea in view, and there is much less trouble through seam leakage than there used to be several years ago before the radiator problem had been given such extensive thought.

There are a great many lesser details in actual radiator design that are important, but are given little thought save by the radiator makers themselves. One of the first of these is the matter of disposition of baffle plates or similar pieces within the tanks so that the water will be distributed properly throughout the core with no excessive amount flowing through one section. Usually the water enters the radiator upper tank at the center, and there must be internal webs or plates that will insure an equal amount flowing down throughout the extent of the core bank. At the bottom, the outlet is usually at one side, which is also a point requiring provision for equal drainage from all parts. It is not a difficult matter to insure this equal distribution, but, of course, the more elaborate the provision for it, the more the cost, although this is not out of proportion to the very advantageous results obtained.

Refinement that is especially appreciated by the car driver is the method of threading the filler cap and filler tube now practised by a great many. What is referred to is the cutting of the cap threads on the inside, which prevents damage to them in case the cap is dropped. It also has the advantage that the filler tube threads are outside, which obviates any possibility of hurting these through the use of funnels, etc. Yet, the writer was surprised to note only recently a new car brought out with the tube and cap threads in the opposite relation on its new shape of radiator; that is, filler threads were inside and cap threads outside.

Although it is hard to find any very logical reason for it, there is a growing prejudice against the V-radiator. Many are of the belief that it is not so efficient. Certainly it does not admit of as great core rigidity, and there seems to be some difficulty to give the water equal distribution. As a tendency, it seems to be giving way to the high and narrow type, but whether this is merely because of a change in car fashion or to real mechanical superiority of the latter is difficult to determine.

Although the radiator of to-day is a very effective unit, it still admits of a great deal of refinement and improvement, and radiator makers and car engineers should get closer together on this very important matter. As a general thing, the radiator engineer knows most about the subject of cooling, what the causes of inefficient engine cooling are, and what factors make for the best all-around efficiency.

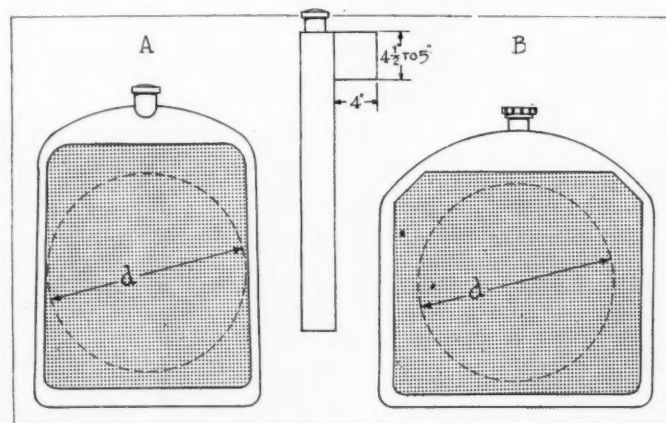
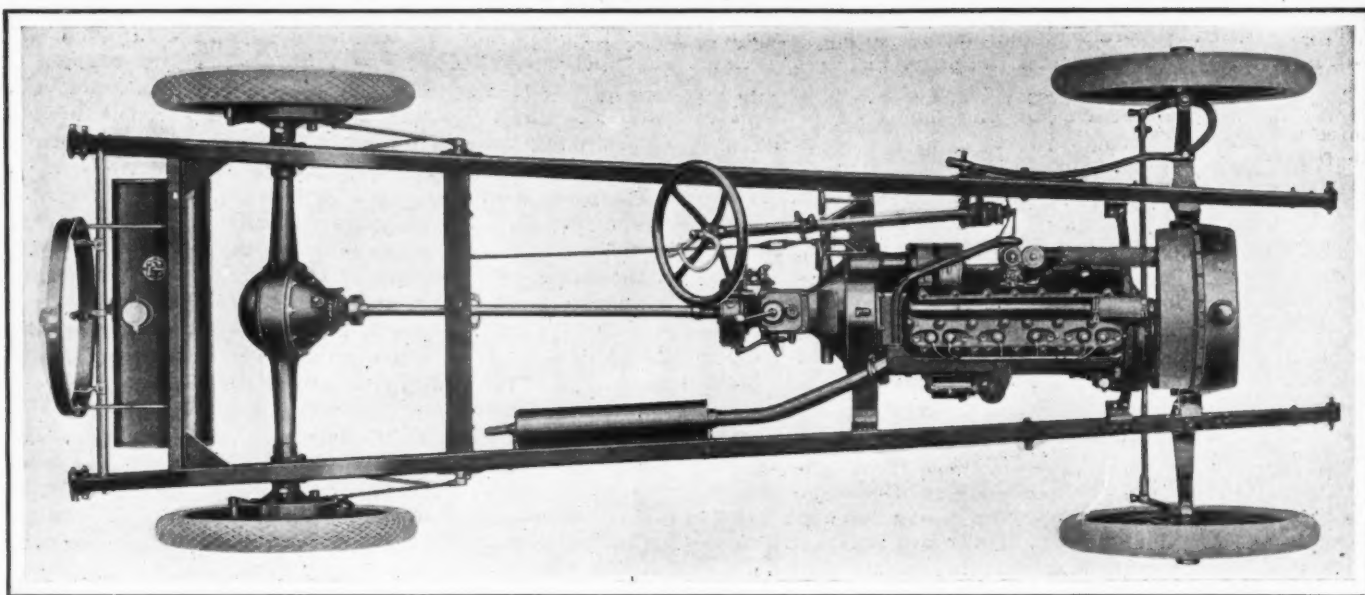


Fig. 1—Diagrams to show advantage of narrow radiator as regards fan diameter. Fan has same diameter in both cases, but it extends entire width of case in case A and leaves some space on either side of B

Fig. 2—Center—Size of upper tank for thermo-syphon should not be less than 4½ in. deep, nor extend back over 4 in.



Plan of Liberty chassis, showing the six-cylinder unit power plant, mounting of Delco electric units and straight taper frame

Colonial Body Lines in New Liberty Six

**Five-Passenger Touring Car To Sell at \$1,095—
Other Models To Follow—Standard Units Make Up
Assembly—Transmission Emergency Brake a Feature**

ALL speculation as to the design and appearance of the Liberty car is now dispelled by the coming of the car itself. The Liberty is to be manufactured in large quantity by the Liberty Motor Car Co., Detroit, Mich., one of the newcomers of last Fall, which is headed by Percy Owen, formerly prominent in the field as sales manager of the Chalmers company and later connected with the Saxon concern. Things have been moving rapidly since Mr. Owen organized his new company, and not only are the first cars on the road, but within a very short time the first production models will be coming through.

Standard Units Used

The Liberty might be considered as new in body and general design, though its parts are mostly known to the motor-wise. It has a six-cylinder Continental engine, Delco electric equipment, Timken axles, Borg & Beck clutch, Detroit Gear & Machine Co. gearset, Rayfield carbureter and Stewart vacuum fuel feed, among other features. At present only a five-passenger touring model is to be supplied, and this is to sell for \$1,095.

Built on a wheelbase of 115 in., the Liberty has sharper angles and straighter lines than are usually to be found in the body shapes of the day, but these have been blended into what might be a colonial tendency, the various curves being carefully proportioned to produce a harmonious effect. There is no bulge at the sides of the cowl, and simplicity at the front is brought out by the sharp edges of the rather high and narrow radiator, these being carried back by both the hood and the cowl. In addition, the car is hung low,

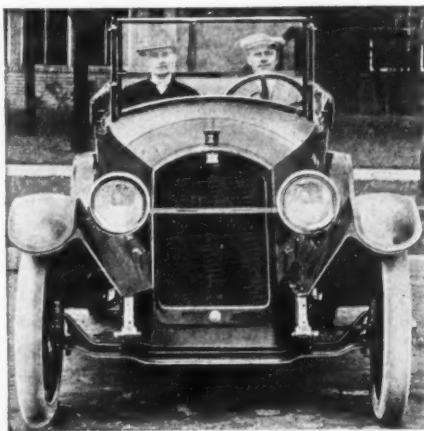
and has a lengthy appearance, as shown in the illustrations.

In addition to this unique body design, there is another point that immediately becomes evident upon examination of the chassis—the extreme simplicity of the mechanism. By using the Hotchkiss type of drive through the springs, and by placing the emergency brake system forward on the transmission, a point that will be touched upon more in detail later, it has been possible to produce a chassis that is about the acme of simplicity. No rods of any kind nor other complications are to be found back of the power plant, with the exception of the one rod which controls the foot brakes on the rear wheel drums. An idea of this can be gained from a glance at the plan view of the chassis.

Cooling Is by Thermo-Syphon

The six-cylinder motor has a bore of $3\frac{1}{8}$ and a stroke of $4\frac{1}{2}$ in., which dimensions give a formula rating of 23.4 hp. with a displacement of 207.1 cu. in., making it evident that there is plenty of power for the chassis, which is really very light. This power plant follows usual Continental six-cylinder practice, with the single exception that the cooling system is of the thermo-syphon type instead of being by a pump. In changing to this simplified method of cooling, specially-designed waterjackets were formed and rather unusual precautions taken against any restrictions in the water passages due to core sand, core wires, fins or other foreign matter.

Built with the head detachable and the upper portion of the crankcase in unit with the cylinder block, a very rigid and substantial construction results. Being integral with the bear-



Front view of new Liberty six

ings that carry the crankshaft, there is no possibility of misalignment between the cylinders and the crankshaft—a feature that is conducive to smooth running and absence of vibration. There are three main bearings for both camshaft and crankshaft, and the moving parts are balanced accurately, pistons and their assemblies being of equal weight throughout.

Cast integral with the head is the large water outlet connection, and on the right are the valves and exhaust manifold as well as the generator and fan drive. The carbureter and starting motor are the main units on the left, the former bolting directly to the cylinder casting high up, with distribution of the incoming gas through cored passages within the casting to the intake ports on the other side. This feature not only makes a simpler motor, but assists in gas vaporization, due to the cylinder heat around the passages. Valves are completely inclosed by two pressed steel cover plates.

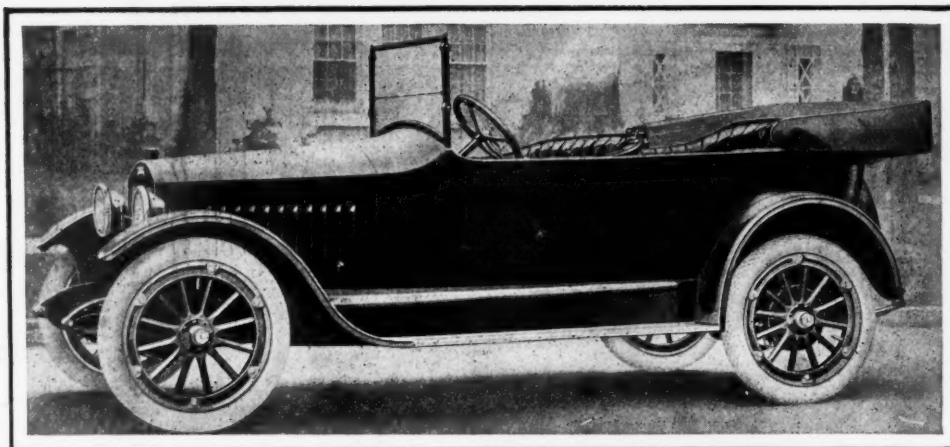
Oiling by Force Feed and Splash

In line with standard Continental design, the lubrication system is a combination force-feed and splash arrangement, whereby the oil is forced through copper tubes direct to the main bearings and the timing gears by a horizontal plunger pump driven by an eccentric on the camshaft. This lubricant then drains back into the oil pan and maintains the splash troughs under the connecting-rods at a constant level. There is an oil pressure gage on the instrument board and a filler gage on the side of the crankcase.

Liberty is among the first to be fitted with the new two-unit Delco starting, lighting and ignition system, in which the ignition distributor and coil are in unit with the generator, the whole being driven by a horizontal shaft on the right, and the starting motor is attached on the opposite side close to the flywheel housing. Starter drive is through the Bendix automatic shifting mechanism, which meshes a pinion with the flywheel gear when the starting current is switched on by a pedal, and automatically demeshes when the engine gets under way and the speed of the flywheel exceeds that of the starter driving shaft. In connection with the control of the ignition distributor, a detail worthy of mention is the use of a flexible wire cable to turn the distributor on the principle of an antenous release. This does away with a complicated set of levers and rods ordinarily employed to actuate the distributor from the lower end of the steering column, especially when the distributor is on the opposite side as in this case.

Single Dry Plate Clutch

Clutch and gearset are in unit with the motor, and they are arranged to



Liberty six-cylinder, five-passenger touring car which sells for \$1,095. This car has a wheel-base of 115 in., the motor is $3\frac{1}{2}$ by $4\frac{1}{2}$ in., and 32 by 4-in. tires are used. Other features are the single dry-plate clutch, transmission emergency brake and reserve gasoline supply

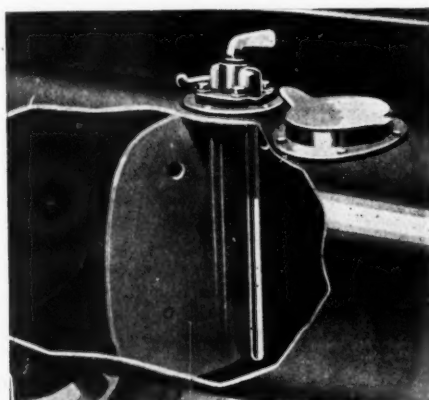
go together very compactly. This is due in large part to the simple single-plate clutch. The plate runs dry and is held in engagement by a pressure of about 2500 lb., which is obtained by stepping up the force exerted by a 200-lb. spring by means of a series of levers. Thus it is practically an impossibility to have clutch slippage with such a large force holding the engagement, and at the same time a reducing linkage makes the throwout very light, it being possible to depress the clutch pedal with the forefinger. The driven plate is held in engagement between two wire-woven asbestos disks, and due to the clutch design, these can be used until entirely worn out with no detrimental results. Adjustment is only a matter of removing the clutch cover plate and shifting two bolts.

A feature not often found on American cars is the emergency brake on the transmission shaft. This is just back of the gearbox and ahead of the front universal joint, bringing it about as close as it could possibly be to the brake lever. The brake consists simply of a drum on the shaft, with an external contracting band around it, this band carried by a yoke attached to the gearbox. The arm of the brake lever attaches directly to the brake rod, greatly simplifying the control. This type of brake, used extensively on foreign cars, simplifies the rear wheel system and obtains the added leverage of the rear axle gear reduction which multiplies the braking effectiveness and requires less effort to stop the car. Further, both rear wheels get an equal retardation, there is less chance for brake road rattling and by bringing the brake forward, adjustment is merely a matter of lifting the floorboard. The emergency drum is 8 in. in diameter by $2\frac{1}{2}$ in. wide, giving a braking surface of 63 sq. in. The service brake drums on the rear wheels have external contracting bands, and are controlled in the conventional way, with the equalizer placed under the intermediate cross member of the frame. These drums are 12 in. in diameter by 2 in. wide.

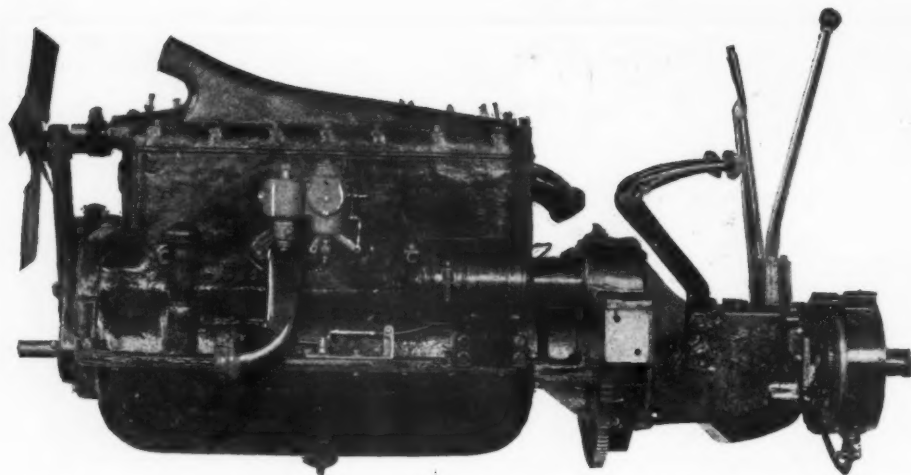
Having incorporated most of the mechanism with the power plant, even to bringing the emergency brake for-



Roomy driver's compartment of new Liberty six



Partition forming 3-gal. reserve compartment in gasoline tank



Intake side of unit power plant used in Liberty six, showing high carburetor mounting

ward, it is evident that the rest of the chassis admits of marked simplicity. The driveshaft, fitted with a universal at each end, is a tubular member that is light in appearance yet amply strong for its work. It conveys the power to a Timken semi-floating axle that has a pressed-steel housing with axle tubes that are swaged and electrically-welded to the housing. The driving gears are of spiral-bevel form, and a two-pinion differential is fitted. The whole mechanism is carried on Timken roller bearings; two back of the drive pinion, one either side of the ring gear and one at each wheel. The standard gear ratio is 4 11/16 to 1.

In order to take the drive and torque, as is required of them where the Hotchkiss drive system is employed, the rear springs are of ample size, being 50 in. long by 2 in. wide, with the master leaves plenty large to care for their additional duties. These springs go directly under the frame rails to give good support, and are semi-elliptic. The rear end of the frame rails are bent down to take the end of the springs, which go under the axle tubes. Thus the springs are almost flat normally and efficient spring action is obtained, while at the same time the body is hung low. The front springs are also of the flat type and measure 38 in. long by 1 3/4 in. wide.

Straight Taper Frame

Special mention should be made of the frame, which is not only of a deep channel to form a rigid ground work for the body and running gear, but is a straight taper from front to rear. This allows of a short turning radius of 20 ft., and at the same time makes a substantial support for the body along its entire length. The channel is 5 in. deep, has a width of 2 1/4 in. and is made from 3/8 in. metal.

Special attention has been paid the detail refinements that mean much for the convenience of the car owner. At the sides of the windshield, for instance, it is often difficult to make the side curtains fit snugly against rain or wind. To take care of this, rubber strips have been provided here as well as at the bottom of the shield, effectively sealing the compartment when the curtains are up. Then the door curtains are made to swing with the doors, making entrance and egress free without damage to the curtains.

Unusual Gasoline Tank

Another feature is the specially-designed gasoline tank at the rear of the chassis. It incorporates a reserve compartment that holds 3 gal., this being formed by means of a dividing wall perforated by two 1/2-in. holes located well up toward the top of the partition. When the main tank is filled to the height of these holes, gasoline flows in to fill the reserve compartment, and two tubes, one on either side of the partition terminating in a three-way cock and leading

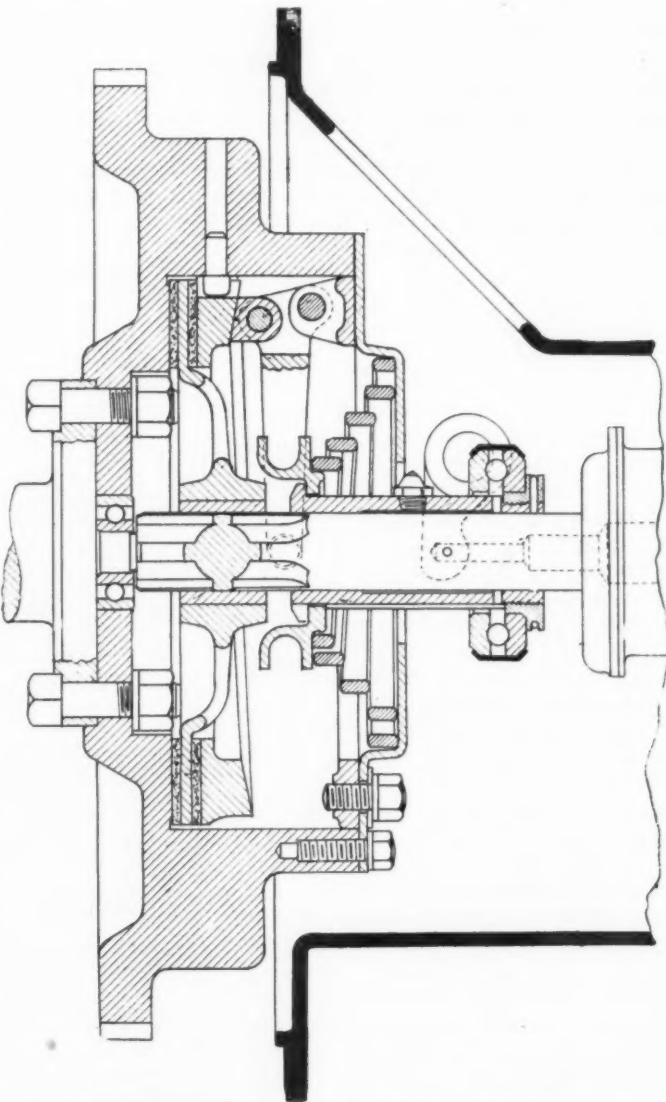
to the main gasoline line, constitute the simple control. Normally fuel is drawn from the main tank, but should this become empty, the control cock is turned and the reserve supply becomes available.

Other Bodies Planned

Grease cups on the spring shackles and at other chassis points have been discarded in favor of oil cups. As an example of the installation of these cups, all shackle bolts are drilled and two small wicks are inserted, the bolt being slightly flattened along the line of these wicks. It is explained that the cups are easily filled with oil, and that it has been found that lubrication is more satisfactory this way than where grease cups are used.

In addition to the five-passenger touring car, the Liberty company expects to build on the same chassis a number of open and closed type bodies. Among these is a close-coupled four-passenger open roadster, besides which there will be a town car that is promised to be of elaborate finish.

Tires are 32 by 4 in., non-skid in the rear.



Section of simple single plate clutch used in Liberty six. The plate is held in engagement by a pressure of about 2500 lb., being stepped-up through a series of levers from a 230-lb. spring. Thus the action is soft and the effect large

Trucks Aid Militia Mobilization

Serve in Many Capacities at Camp Whitman



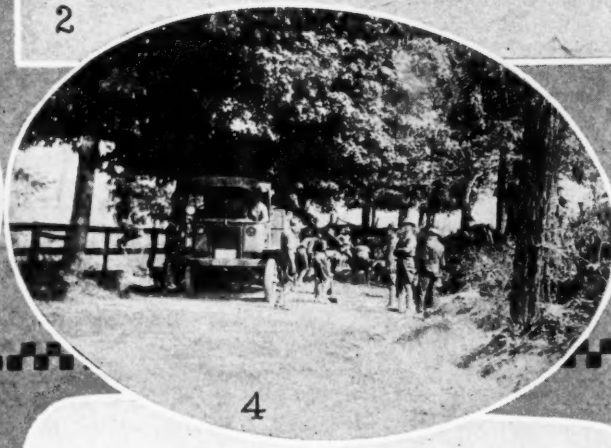
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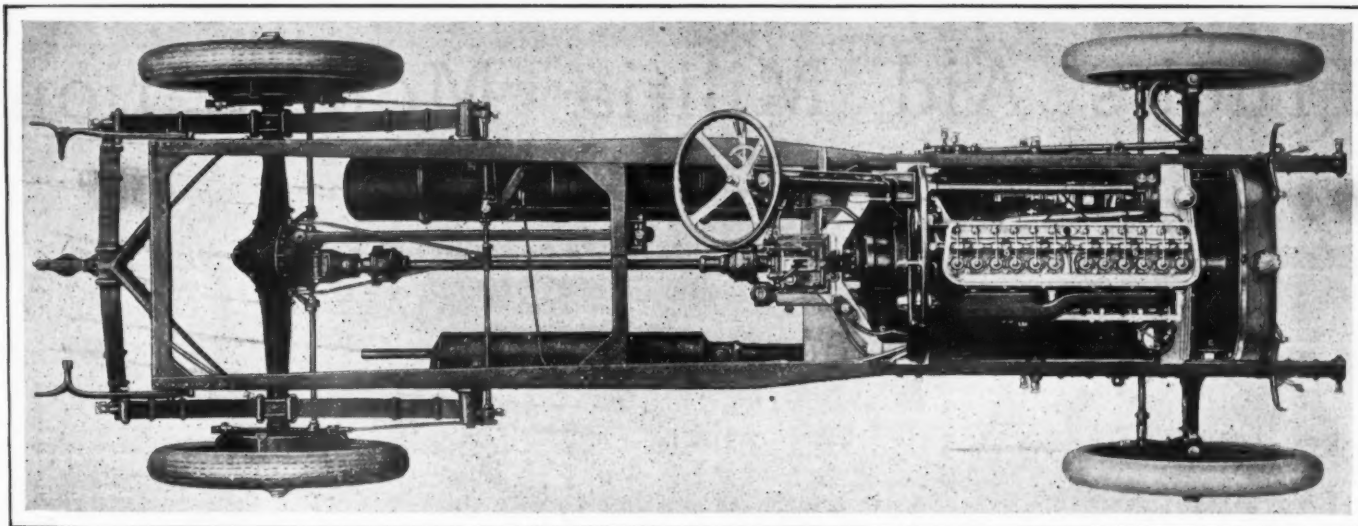


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- 1—Unloading pipes for water supply from 5-ton Saurer
- 2—White 1 1/2-ton truck and army wagon as trailer coming into camp
- 3—Garford 3-tonner with army wagon on way to Camp Whitman from supply station at Peekskill
- 4—Garford 3-tonner owned by W. F. Chambers & Sons of Peekskill and hired for hauling at Camp Whitman
- 5—22nd Engineers strengthening a bridge
- 6—Unloading sanitary equipment from Garford 3-tonner
- 7—White 1 1/2-tonner arriving at Camp Whitman with army wagon as trailer after 2-hr. trip from Peekskill
- 8—White 1 1/2-tonner used in telephone service along the route to Camp Whitman



8



Plan view of 1917 Dorris six chassis, showing overhead valves, unit power plant, platform rear spring and tire carrier brackets. Note the cylindrical gasoline tank mounted beside the left frame member

Dorris Oiling System Now Force Feed

Better Body Design and Racing Type Radiator Improve Appearance of 1917 Model—Top Has Also Been Re-Designed—Few Changes in Chassis Construction—Price Is Continued at \$2,475

AN entirely new car in looks, the Dorris model IB-Six for 1917 has a new body of better lines and a radiator which is a distinct departure from the former type. The mechanical changes are few, in fact no radical alterations have been made except in the oiling system, which is now of the force-feed type. The price of \$2,475 remains unchanged.

The fundamental construction of the Dorris car has not been changed in 11 years. Features of the design which have weathered the tests of time and are even at this date most up-to-date practice are: valve-in-the-head motor with valves actuating from one camshaft, unit power plant, multiple-disk clutch, Timken axles, platform rear spring and 22-in. fan-type flywheel. The car has a 128-in. wheelbase and is fitted with 36 by 4½-in. tires.

The 4 by 5-in. six-cylinder motor was introduced last year with practically the same elements of design as characterized the four. The oiling system for the 1917 model takes care of all motor bearings and the overhead rocker arm bearings from the pressure pump. Oil is forced to the wristpin bearings through a copper tube embodied in the crankshaft drop forging. The breather tube opens into the inclosed overhead valve compartment, utilizing what oil vapor is given off for a valve lubricant. Of course this is only an added source of oil supply as the rocker arms are hollow and oiled direct from the pressure pump.

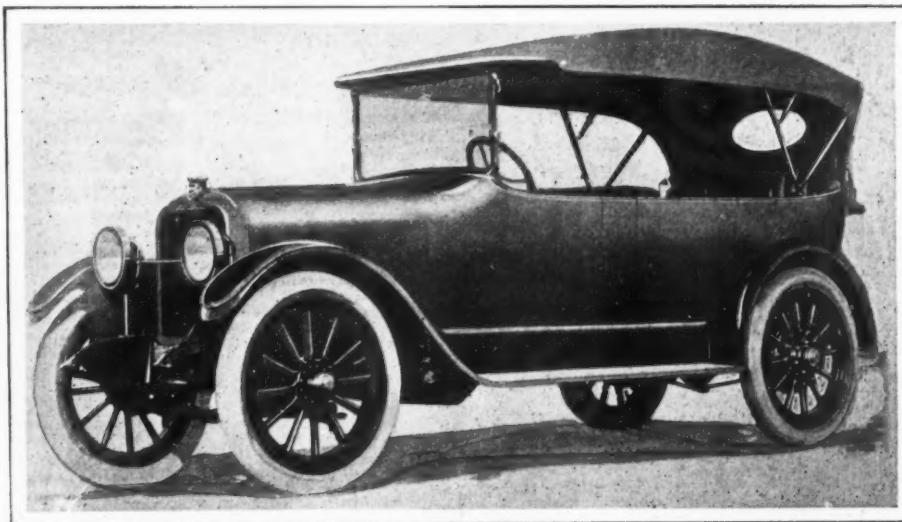
An added feature in the oiling system which, although a very small item, is of unusual value to the car owner, is the petcock drain, in place of the usual pipe plug. This drain cock is easy to reach and permits the

owner to drain his crankcase regularly without inconvenience. Dorris lays particular stress on this matter of cleaning out the crankcase, because of the poor grades of oil and gasoline now on the market.

Radiator of Racing Style

The new body is of striking originality. The radiator is patterned after that used on the Peugeot racing cars. Both the front and the back seats will comfortably carry three people. Body refinements are noticeable throughout. As another step towards simplicity and accessibility, an aluminum dash is fitted which is made a part of the chassis itself. All electrical wiring is carried on this dash and none of the fittings have to be disturbed when occasion demands that the body be removed.

The one-man top has been redesigned, with a view to creat-



Dorris six-cylinder touring car for 1917 which sells for \$2,475

ing a conformity between the body lines and the top itself, with striking results. Although the height of the top is sufficient to give clear vision to the occupants of both seats and allow entry with but very little stooping, the design has been so worked out that the extra height is not noticeable.

Curtain Refinements

The Dorris idea of perfecting every item, no matter how small, is evident in the construction of the side curtains. Irons are provided which fit to the back of each door attached by the aid of thumb screws. The curtains fasten solidly to the top and body on one end and slide over these irons on the other, making an assembly which permits opening and closing the doors without unfastening the curtains. A flap is provided over the rear window of the top which can be let down during night driving when the glare of street lights throws a reflection through the rear window onto the windshield, hindering the vision of the driver.

Although the Dorris chassis design has been refined rather than changed for a number of years a résumé of the principal characteristics will show how thoroughly modern each unit is. The crankshaft is suspended on seven bearings, eliminating any possibility of a sprung crankshaft or a vibrating crankshaft. The camshaft is carried on the same number of bearings, and, according to the factory, this construction is invaluable in a large six to maintain rigid cams and thus establish perfect timing under any conditions.

Valves Easily Removable

Each valve is set in a cage which is readily removable with the aid of a wrench. The push rods, which float between springs on the upper and lower end, are actuated from the camshaft by the means of rollers. The assembly which contains the rollers is kept from revolving by the aid of steel pins sliding up and down in slots within a brass shell. Perfect action without noise and maximum reduction of wear are claimed for this design.

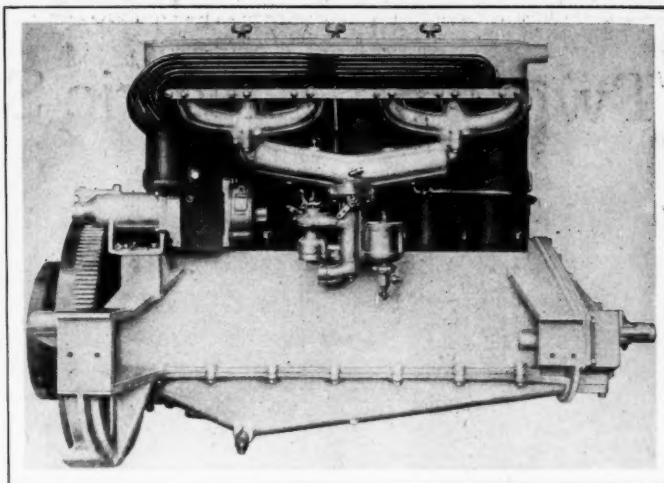
Although the power plant is a unit with the motor it is not inclosed in a housing integral with the motor as is usual practice. The reason for this is that the large flywheel contains fan blades which assist in the motor cooling and carry the heat away from the front seat floorboards. To enable the air to circulate from this fan, the gearset is fastened to the motor with arms which are a part of an aluminum casting.

The gear train drive of the starter has been discontinued and the Bendix system is used in its place. The two-unit Westinghouse starting and lighting system and Bosch magneto ignition are continued without material change except in the starter drive as mentioned above, and the routing of wires from the new aluminum dash described previously.

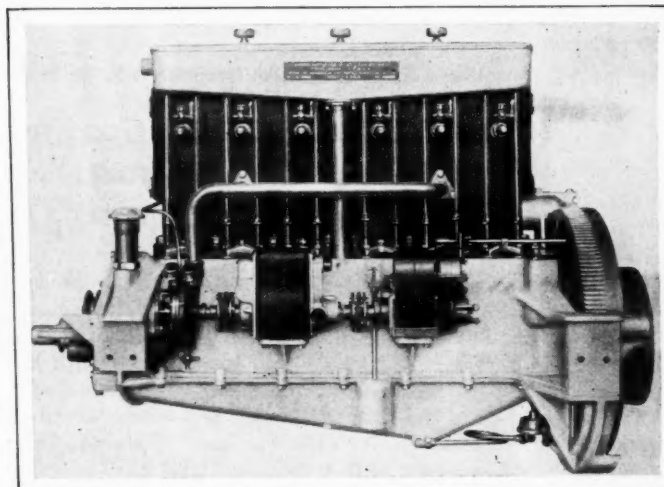
Dorris has long been an advocate of platform spring suspension. The new car is carried on exceptionally large springs, the rear side members being 50 in. long and 2½ in. wide, with eight leaves; the cross spring is 40 in. long by 2½ in. wide, with eight leaves, and the front springs are 42 in. long by 2½ in. wide with ten leaves.

For the rear axle a Timken product is again used with spiral bevel drive and 2½ in. wide brakes of large diameter. The torque is taken care of through a forged torsion bar suspended between the rear axle and a bracket on the center cross frame member.

A peculiar little detail that seems to make for convenience and better distribution of weight is the use of a pressed steel cylindrical gasoline tank located next to the left side member of the frame. This placing enables a filler and a gasoline gage to be arranged so that they stand almost flush with the front floorboard; the gage can be seen at any time by glancing downward, and the filler is accessible by merely opening the side door. A Stewart vacuum feed is employed for raising the fuel to the carbureter.



Right side of 1917 Dorris six-cylinder motor, showing arrangement of intake and exhaust manifolds and mounting of carbureter



Left side of the motor, showing the mounting of the ignition and lighting units. Note the inclosed overhead valve mechanism

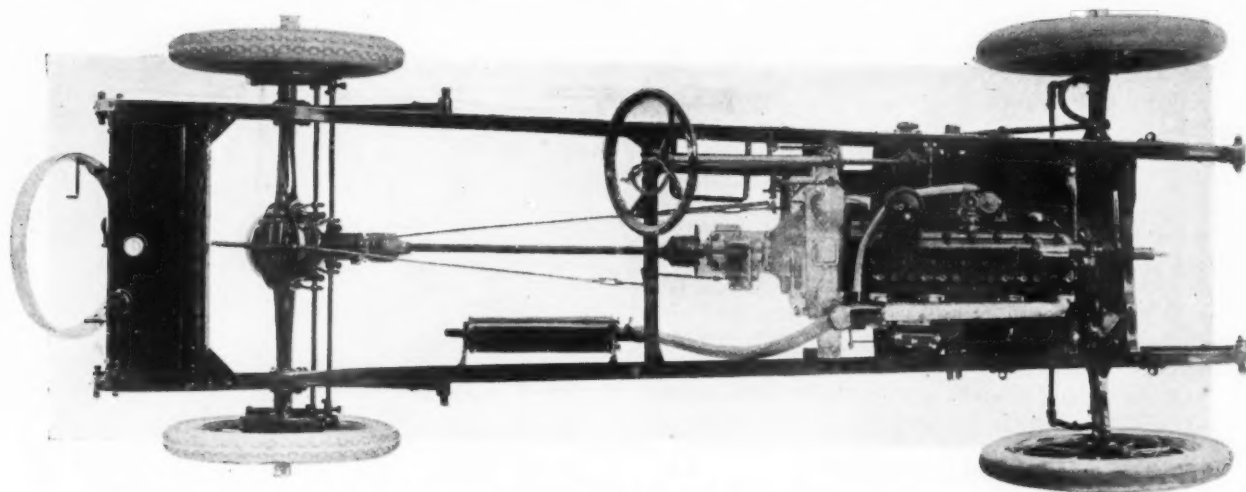
Every part of the car but the body and axles is Dorris built. The gearset retains the feature incorporating a locking device by means of which the gears cannot possibly be shifted until the clutch is released, and there is no possibility of more than one gear being engaged at a time.

The equipment of the new car is complete, including Stewart tire pump and horn.

Spending \$22,605 for Shop Economy

FORD, ONT., June 24—Big economies sometimes cost considerable money. This was illustrated at the factory of the Ford Motor Car Co., this city, where the rearrangement of the machine shop cost \$22,605. Four hundred new machines costing \$325,000 were installed in the new machine shop opened recently, the floorspace being increased by over 2 acres. The progressive assembly system demanded that 1300 heavy machines be moved to new locations, so that successive operations might be performed on adjacent machines. To move these, Ford pony cars of the type used to haul material from one part of the factory to another were brought into service. These were attached to one, two and three and even four machines, which were dragged along the floor of the factory. In some cases the hauling was for almost the entire length of the machine shop. 705 ft. Labor and materials for putting in the new machines cost \$13,375, and the expense of removing the old ones was \$9,230.

Two-Unit Electric System in New Moons



Chassis of the 6-66 model Moon for 1917. Note the clean design and general simplicity of the assembly

Two Sixes Are Continued for 1917 as Models 6-66 and 6-43—Automatic Spark Advance Used—Four-Passenger Roadster Added for Larger Chassis

IN accordance with its plans to adhere strictly to the construction of high-grade six-cylinder cars, the Moon Motor Car Co., St. Louis, Mo., will continue its two 1916 chassis for the coming year. The model 6-40 is continued with but few changes as the model 6-66 and the car of later design known as the 6-30 in the 1916 production will be continued as the model 6-43. The price of each has been increased. The larger car which was listed last year at \$1,475 now sells for \$100 more and the small six has been increased in price from \$1,195 to \$1,250.

Two-Unit Electric System

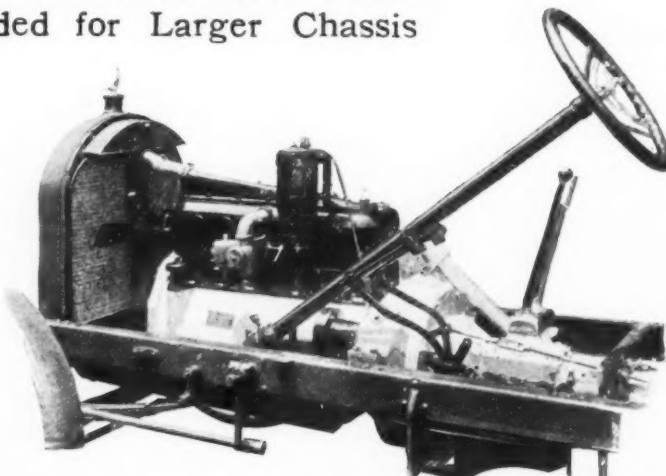
The most noticeable change in both chassis is in the electrical system, a two-unit outfit being used in place of the single starting and generator equipment of the 1916 models. The new Delco-Moon two-unit system embodies an automatic spark advance and a new switch with an ammeter in connection.

The bodies have also been refined and the 6-66 touring now has the tonneau cowl. The tops of the bodies have been tumbled in, creating a marked streamline effect. Acting upon the great demand for four-passenger roadsters, the larger six is offered with an unusually attractive body of this type at the same price as the touring car. A light six can be had in a three-passenger roadster at the same price as the five-passenger touring car.

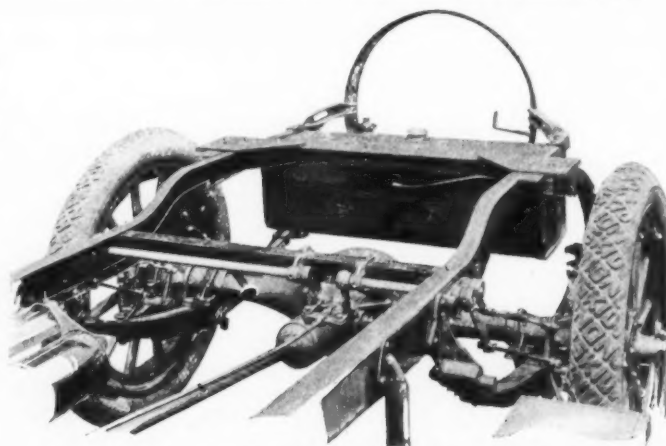
The two models are mechanically similar, the difference being principally in the size of the parts. Continental motors are used of $3\frac{1}{4}$ by $5\frac{1}{4}$ and $3\frac{1}{4}$ by $4\frac{1}{2}$ cylinder dimensions fitted with Delco cranking, lighting and ignition units and the Stewart vacuum feed system. The clutch is disk in unit with the motor, the gearset a three-speed selective type and drive is by a hollow shaft to a floating axle. Timken axles are used, front and rear.

Bendix Drive Used

The adoption of the double unit Delco system is accompanied by the use of a Bendix system of drive on the starting motor which is now bolted to the left side of the crankcase.



Intake side of the power plant of the Moon 6-43 model for 1917. Note the absence of complications and the general accessibility. The carburetor is mounted high and the Stewart vacuum fuel feed tank is close beside it. Note the flexible exhaust pipe



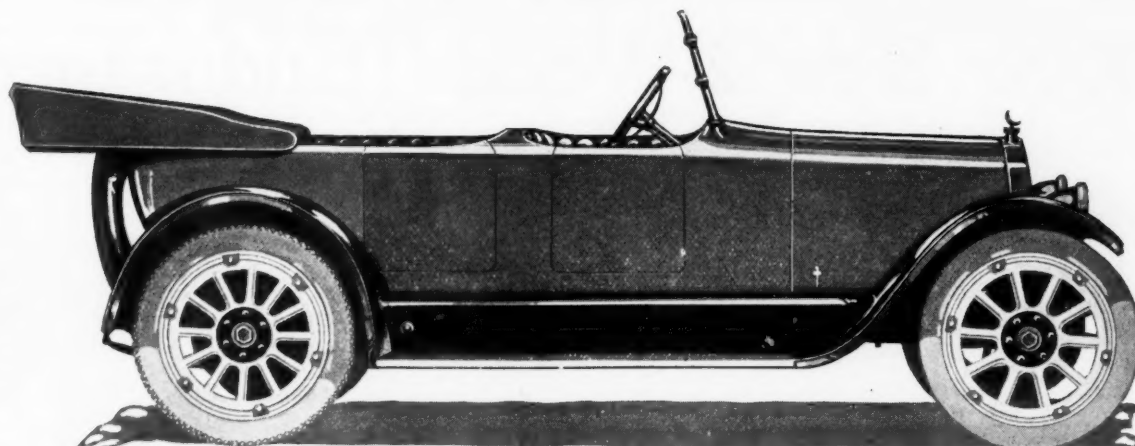
Rear construction of the new Moon chassis, showing the rear springs slung under the axle, Hotchkiss drive being used. Note the strong brake linkage and the gasoline tank supports which are integral with the frame

The generator is still located on the right side of the motor and is driven from the water pump shaft. On the right side also is the exhaust manifold which has attached a flexible tube instead of the non-flexible type commonly used for carrying off gases. The oiling system in both motors is the same combination splash and force feed as used in other large Continental power plants.

Hetchkiss Drive Employed

The drive from the motor is conducted to the rear axle through the Hotchkiss principle, double universals and a floating axle being used. Moon engineers have carefully worked out the framing design to take care of the Hotchkiss drive. The frame is of bottle-necked shape in front to enable a short turning radius and is constructed in the rear to form an integral support for the gasoline tank and tire irons.

Although accessibility has been a big factor in the design of the chassis throughout the same careful attention has been given the design of the bodies and the kind and location of the equipment. The touring car tonneaus are unusually

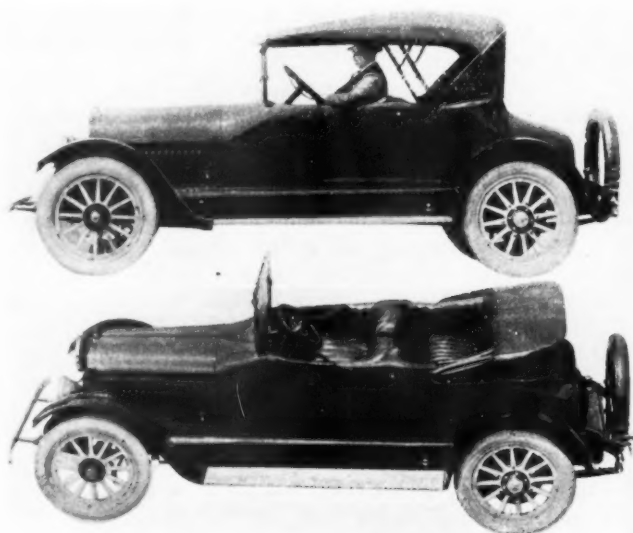


Moon 6-66 touring car which has a tonneau cowl and slanting windshield. Note the smooth body lines

large with wide doors having concealed hinges and locks. Both front doors open wide, permitting the driver to enter from either side. Upholstery is of genuine leather, stuffed with curled hair. A slanting windshield has been incorporated to enhance the speedy lines of the cars and a Stewart tire pump and Warner speedometer, driven from a gear which constitutes the flange on the front universal, are standard equipment on both models.

Tires Larger on Big Six

Tire sizes have been increased on the big six. The 6-66 is equipped with 35 by 4½ in place of 34 by 4 tires and the 6-43 carries 34 by 4, the same size as last year. The wheelbase of the larger car, model 6-66, is 125 in., while that of the 6-43 model is 118 in.



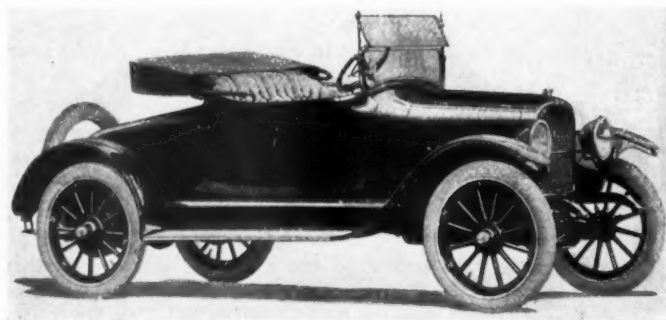
The new Cole eight-cylinder four-passenger Tuxedo roadster

Cole Adds Four-Passenger Tuxedo Roadster Model

CONCENTRATION on the production of one chassis enables the Cole Motor Car Co., Indianapolis, Ind., to offer a wider variety of body styles than heretofore. Distinctive among the new types is the four-passenger Tuxedo roadster mounted on the eight-cylinder Cole chassis. This new model is practically a small touring car, built for four passengers but with sufficient room for traveling accoutrement.

Ample Storage Space

The Tuxedo model has a divided center cowl and a rear deck which contains a roomy baggage compartment accessible by tilting the back of the rear seat forward a few inches, furnishing an air, dust and waterproof compartment. There is also a special alcove in the back of the front seats which makes possible additional knee room and foot comfort for those riding in the rear seat. Vanity pockets on the sides of the car afford convenient repositories for veils, goggles and other traveling equipment.

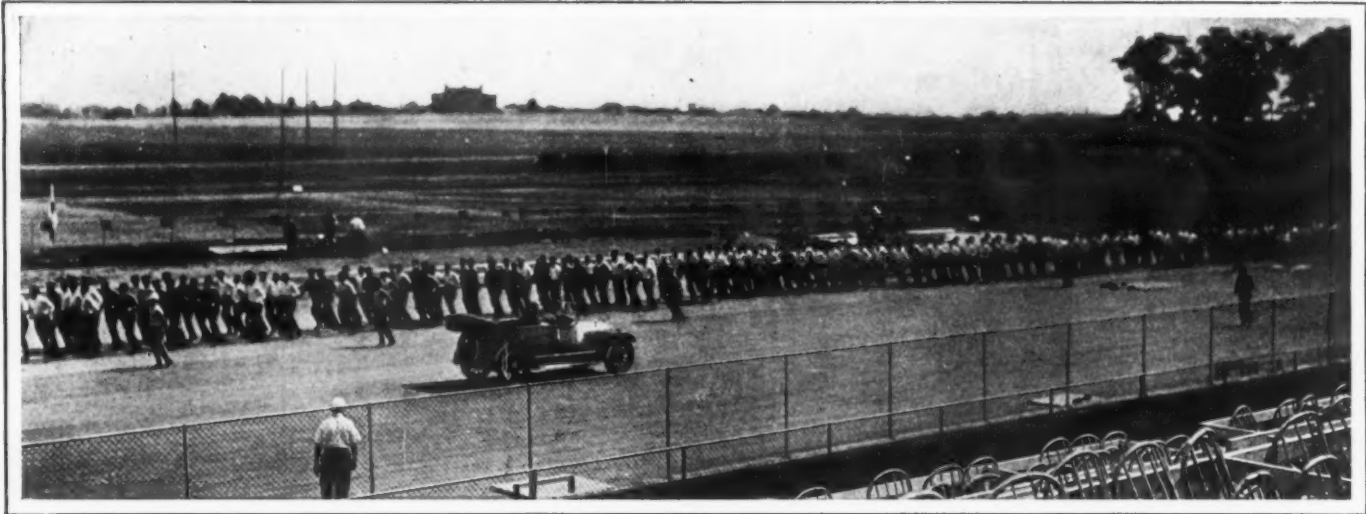


Allen 37 four-cylinder 1917 roadster selling at \$795

Allen Brings Out New Roadster

A NEW two-passenger roadster has been brought out by the Allen Motor Car Co., Fostoria, Ohio, selling at \$795 f.o.b. the factory. It is mounted on the standard Allen chassis fitted with a 3¾ by 4 in. four-cylinder block unit power plant. The 112-in. wheelbase and 55-in. rear springs insure easy riding qualities, the seats being carefully proportioned and fitted with deep cushions. There is a big waterproof rear deck compartment and the body and wheels are finished in olive green with radiator, hood, fenders and running gear in black enamel.

King 8 on 2-Weeks' Endurance Run



The New York City police had a field day at the speedway but the King eight kept on its way

SHEEPSHEAD BAY, N. Y., June 27—Running steadily, day and night, and circling the board track at a speed of more than 30 m.p.h., the King model E stock car, which started upon its non-motor-stop run on Thursday, June 15, has now completed over 9000 miles of its journey. The motor has never been stopped for a second since the test started, and when it comes to its close on Thursday, June 29, it will have run continuously for 2 weeks.

This test is designed to show the dependability of the car under conditions which are similar to those of actual use by an owner, but more severe as far as average speed is concerned and as far as continued running has its influence. In the 2 weeks of continuous motor running the car will have traveled a distance equivalent to that given in 2 years of service by the ordinary owner. At the end of the first week of travel nearly 6000 miles had been covered or as much as the average car owner will drive in 1 year, and this without a single stop of the motor. Since the car started on its journey at 12.14 on June 15, the crankshaft has not stopped revolving.

In carrying out this test the King company has established a headquarters on the speedway, having moved a corps of drivers and mechanics to the spot and also provided quarters for the American Automobile Assn. officials, under whose direction the test is carried on. The committee in charge is made up of F. E. Edwards, chairman, J. Edward Schipper, Harry A. Tarantous and Fred Elsner. The drivers each take the wheel for 5 hr. at a stretch and have 10 hr. rest

between periods. The mechanics are also riding under similar conditions, the same mechanic always being with each driver. The drivers are men from the experimental and testing departments of the King factory in Detroit, and the car is one taken from the regular production in the factory and has been certified as standard stock throughout.

The entire equipment of the car is also stock, even to such small details as the voltage of the lamps, etc. The car is being driven at a speed of very close to 30 m.p.h., the average being somewhat higher than that as it passed the 9000-mile mark.

The whole distance has not been covered on the board speedway, as the car was driven 200 miles over the roads of Long Island during the morning and afternoon of Saturday, June 24. During this time the car was off the track for 9 hr. continuously and was put through touring conditions of hilly country and variable road conditions before returning to the track and continuing its circuit around the same bowl which has staged the Astor cup races and other races.

While the official figures have not yet been checked over and announced by the A. A. A. officials, it is expected that the gasoline and oil consumption of the car will be very low in spite of the 30-m.p.h. speed and the difficult weather conditions such as continuous rain, thunder storms, varying temperatures and humidity, etc. The windshield is up, and besides the driver and mechanic in the front seat, the tonneau of the car is ballasted with sand bags to represent a passenger load. The top is in place but is carried in its down or closed position and an extra tire and rim is carried on the rear so that throughout from one end to the other the entire car is in the same condition as it would be placed on the road by the ordinary owner.

At the conclusion of the test the engine will be torn down and rechecked for the information of the A. A. A. and also for engineering inspection by the King company. During the course of the run there has been no decrease in power of the engine, but, as a matter of fact, while on the track the car has been driven with the hand throttle, and for the same throttle opening higher speeds have been made than with the



Official send-off of the King eight on its 2-weeks' run by Starter Wagner

original setting. The tire equipment of the car is exactly the same as stock with Firestone plain tread in front and Firestone non-skids in the rear. The extra tire carried is a Firestone non-skid. The gear ratio is also standard, and while traveling the lamps are carried lit for a large percentage of the time, giving the lighting system as rigid a test as the other parts of the car.

The car making the run has a 3 by 5-in. V motor with a formula rating of 28.8 hp. and a piston displacement of 282.7 cu. in. The motor is cast in blocks of two and is made by the King company. Lubrication is by pressure; Atwater Kent ignition is used; a Ball carburetor with a hot air pipe and vacuum feed is also used. A Ward Leonard starting and lighting system is another feature. Other features include: plate clutch; spiral bevel drive; the car is driven through the springs; has floating rear axle and 33 by 4-in. tires.



Replenishing the supplies of the non-stop-motor King eight

A New Demountable Rim Patent

Hydraulic Pressed Steel Co. Secures Rights on
Wood Wheel Rim and Also on New Steel Wheel

TWO new demountable rim constructions which are claimed not to infringe the Perlman patent have been granted by the U. S. Patent Office to O. A. Parker, manager of the wheel department of the Hydraulic Pressed Steel Co., Cleveland, Ohio. The company states that it assumes from the granting of these patents that the essential feature of the Perlman patent is the use of a single nut or similar device which operates a wedge holding the rim both laterally and radially. In the new patents the rim is secured radially by one set of attachments and laterally by another. Further, it is claimed that these individual attachments are of great value in that they prevent the rim from being misplaced. Since neither the radial nor the lateral attachments have a wedging action and simply exert straight pressure, it is possible to tighten one completely before passing on to the next. There is no need to tighten the various securing nuts progressively.

The Wood Wheel Rim

The nature of the invention is shown clearly in the accompanying illustrations. Taking the wood wheel first, this has a felloe band with a flange, which is not coned but merely stands square to the wheel. On one side of the demountable rim, beside the valve hole, there are some dowel pins which take the drive. Opposite the dowel pins several bolts or set

screws are threaded radially through the felloe. Close to these radial bolts are two or three transverse bolts by means of which small tongues of steel are drawn against the outer edge of the detachable rim, so pressing it laterally against the flange at the back of the felloe band. To attach the rim the valve dowel pins are hooked into the holes provided for them and the rim is then pushed on the wheel. The lateral clips can then be tightened, pressing the rim back against the shoulder on the felloe band and a few turns of the radial bolts will then complete the locking.

The Steel Wheel Construction

The steel wheel operates on much the same principle and is based upon the already well-known Parker steel wheel. In this case there is no felloe band, the rim attaching to the ends of the spokes. These spokes are provided alternately with radial locking bolts and lateral clips, the detail being shown very clearly in the illustration.

It is claimed that the new rims are lighter than the majority of demountable patterns and that they have a manufacturing advantage in that no hot-rolled parts are required, the rims being rolled up from ordinary sheet. It is announced by the Hydraulic Pressed Steel Co. that it will be in a position to commence deliveries on a large scale almost immediately.

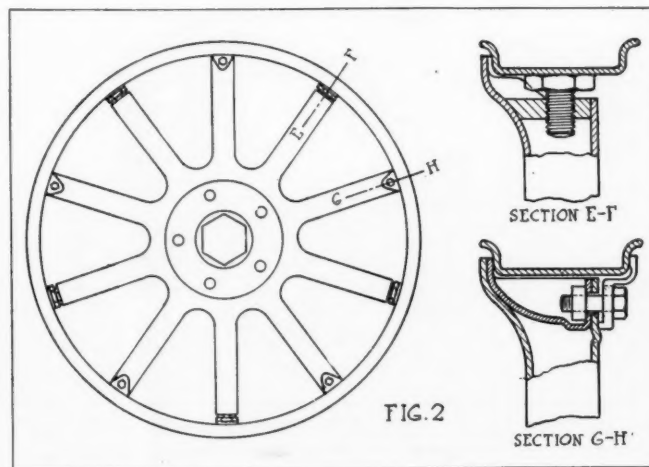
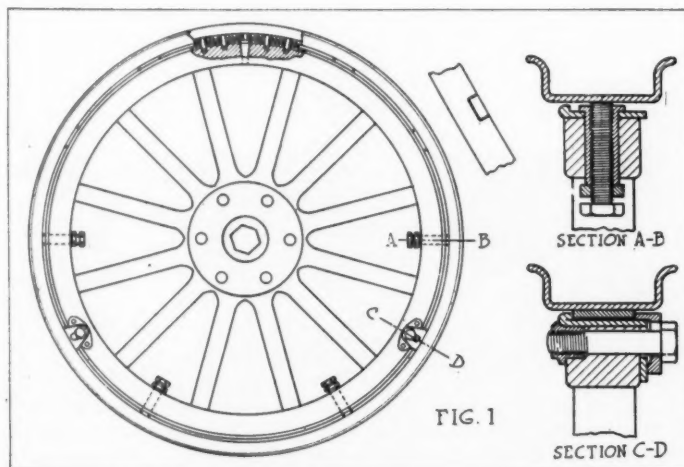


Fig. 1—Elements of Parker patent on demountable rim construction. Fig. 2—Improved design of the Parker steel wheel recently patented

Street Sweeper with Brush Encased to Produce Auxiliary Suction

WHAT may be considered the most up-to-date type of road sweeper is manufactured by Clayton & Co., Ltd., in Grosvenor Road, S. W., under the name of the "Hill's Patent Motor Vacuum Road Cleanser," but it is not really operated on the principle of a vacuum sweeper, having in common with this type mainly that it carries away the sweepings. Some illustrations and a cursory description accompany this statement in *The Commercial Motor* (London) of May 11 and serve as authority for the following:

The machine is built with a "Karrier" motor truck chassis supplying the vehicle features, and its powerful Tylor motor drives the rotary brush sweeper as well as the vehicle. The brush is contained within a steel casing and can be expanded by ingenious means—partly explained below—so as always to scrape the side of the casing and at the same time exert sufficient pressure on the road to remove all loose dirt and dust. The sweepings are carried around by the brush and thrown off by centrifugality through an opening above it leading into a receiver tank of 75 cubic feet capacity, this volume of sweepings representing an average weight of 3 tons.

Above the receiver there is placed a water tank of 100 gallons capacity, whose contents are sprayed in front of the brush, to obviate as much as possible the rising of the dust. A small pump driven from the vehicle motor adds force to the spray and helps to secure against clogging of the nozzles.

As the weight of the vehicle when nearly full is very considerable (apparently about 7 tons), and the work of driving the brush is added, the Tylor motor is necessarily of large dimensions, with 5-inch bore and 6-inch stroke. It is mounted under the driver's seat. The propulsive transmission from the gearbox, which is bolted up to the motor, takes place by means of a pair of bevels to a long shaft carried in a casing at the right-hand side of the chassis, and this drive-shaft conveys the power by worm and worm-wheel to a differential and cross-shafts situated a short distance in front of the rear road wheels. From the cross-shafts to the wheels the final transmission is by chains.

The brush is driven from the front end of the motor through a clutch which is operated by a separate control lever. It is entirely independent of the propulsion mechanism

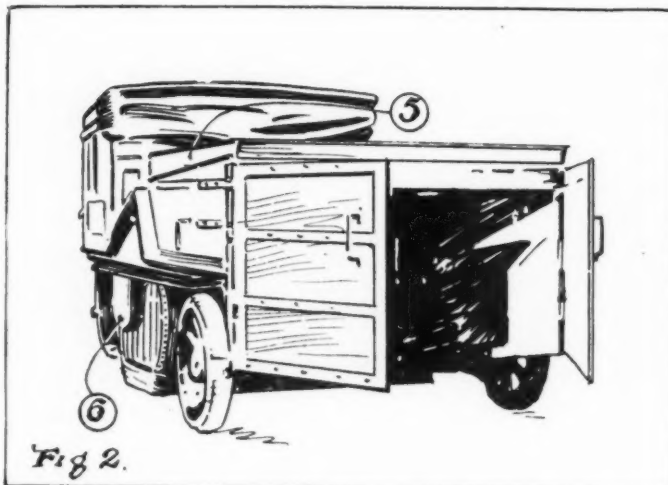


Fig. 2—Rear and left-side view, with discharge doors of refuse tank open. 5—Location of 100-gallon water tank. 6—Casing for chain operating the brush

of the vehicle. It is 4 feet in diameter and 7 feet long, extending so far to the sides that the edges of the pavement can be swept as well as the middle of the road. Each of the 20 smaller brushes of which it is composed is slung in the outer ends of a pair of levers which are here carried by nuts on a shaft with right and left-hand screwthread. By revolving this shaft the diameter of the whole brush can be altered at will to take up wear, keeping it always 4 feet in diameter until the bristles are quite worn down. Revolving at high speed, the brush sets up a considerable draft within one side of its casing, and this action, intending to collect dust by suction, accounts for the name of the machine.

Figs. 1, 2 and 3 show the general appearance and give the location of details by reference numerals.

[The adjustment of the brush appears to depend on a parallelogram action of the pairs of radiating levers supporting the individual brushes in conjunction with some provision for maintaining the side reach of the brush constant. Suction is probably assisted by the high circumferential speed of the brush, which is operated with the driving movement, not against it.]

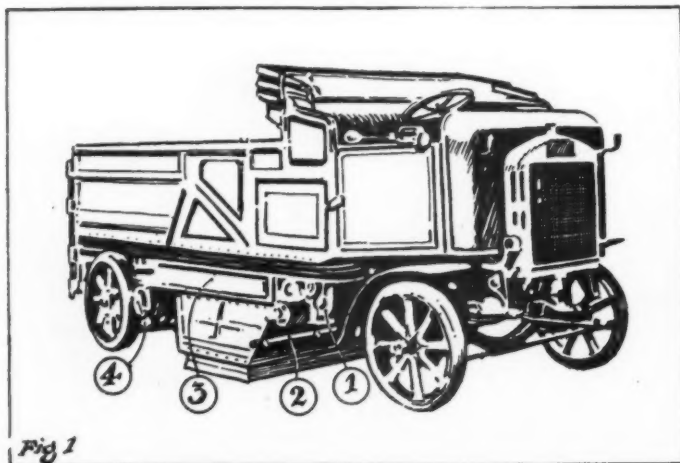


Fig. 1—Three-quarter right front view of Hill's Vacuum Road Cleanser. 1—Three-speed and reverse gearbox for transversely mounted motor under driver's seat. 2—Pipes for spraying water in front of brush. 3—Casing for main driving shaft. 4—Worm and worm-wheel with jackshaft and differential

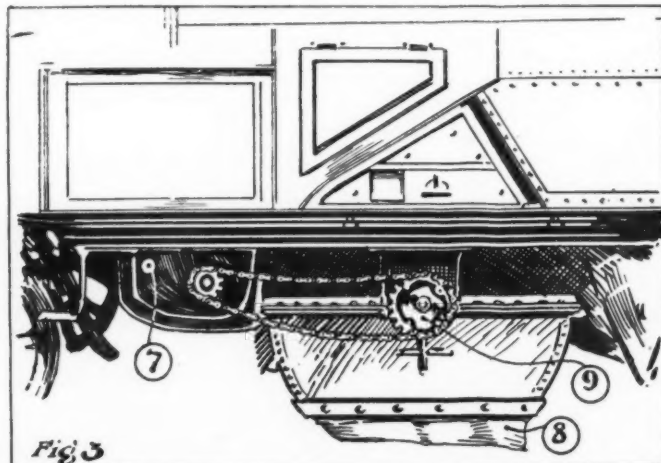


Fig. 3—Left side view, front portion. 7—End of motor shaft, with starting clutch. 8—Leather flaps reaching to the ground to confine sweepings. 9—Chain for driving the brush; casing removed; to adjust brush diameter for wear, long-handled spanner is applied in 4 holes in rear sprocket to turn shaft

Constant-Mesh Gears for New Buses

Paris Renews Omnibus Service with Chassis of Changed Design
and New Streamline Bodies—Wood Wheels to Go



New Paris omnibuses have streamline effect with unbroken roof and scuttle dash

PARIS, JUNE 6—Twenty-two months after withdrawal on account of the war, the Paris motorbus service has been partially re-established with a single route served by thirteen buses running on a five-minute schedule. The established line is over the main boulevards from the Madeleine to the Bastille.

Interest attaches to these buses by reason of the good service they have performed in the war, and the modifications which have been carried out on the new models as the result of war experience. It was an old-standing arrangement that in case of mobilization the whole of the motor buses of Paris should be equipped with special meat-carrying bodies or with lighter bodies for the transportation of troops. The parts necessary to modify the buses were kept in stock, so that within 48 hr. the Paris motorbuses were transferred from civilian to war service.

Several attempts have been made by the bus company to re-establish its service, but on every occasion the vehicles were requisitioned by the army as soon as completed. It may be taken that the army now has sufficient supplies, for the last batch of thirteen has been allowed to go on the streets, an assurance having been given that they will not be taken over by the military. There is no intention of resuming the whole of the Paris service while the military situation remains as at present. Before the war Paris got its motorbuses from the De Dion Bouton and the Schneider factories, the bus company making most of its own bodies and its own road wheels. Lately the company has shown a desire to build its own vehicles, although being dependent on the De Dion Bouton and other factories for many components. There is an impression that the company will eventually follow the example of London and build entirely in their own shops.

The single decker type of bus, carrying thirty-five passengers, with driver placed above the engine, has been maintained as the most suitable for Paris conditions. The engines of the new buses are built by the De Dion Bouton Company, and are four-cylinder L-head type, cast separately, of 4.3 by 5.9-in. bore and stroke. There is nothing very distinctive in the design except that, unlike the majority of French trucks, they are governor controlled. Cooling is by thermo-syphon,

but instead of the De Dion Bouton radiator the Solex type is used. This is a circular tube radiator with centrifugal fan discharging hot air laterally.

Originally the Paris motorbuses ran on a 50 per cent mixture of benzol and alcohol, but immediately before the war were using benzol only. Now, owing to the commandeering of benzol supplies, they are using gasoline in a modified Zenith carbureter. Lubrication of the engine is by De Dion pressure system to the five main bearings and to the connecting rods.

The entire power plant is carried on an elongated U-sub-frame 3-point suspended to the main frame and about a couple of inches below this latter. The underpan has been abolished and no attempt has been made to fill up space between main and subframes. As the magneto is driven by a cross-shaft across the front of the engine it appears to be in a rather exposed position, but on city service no trouble is experienced from this cause. The De Dion Bouton type of plate clutch is used.

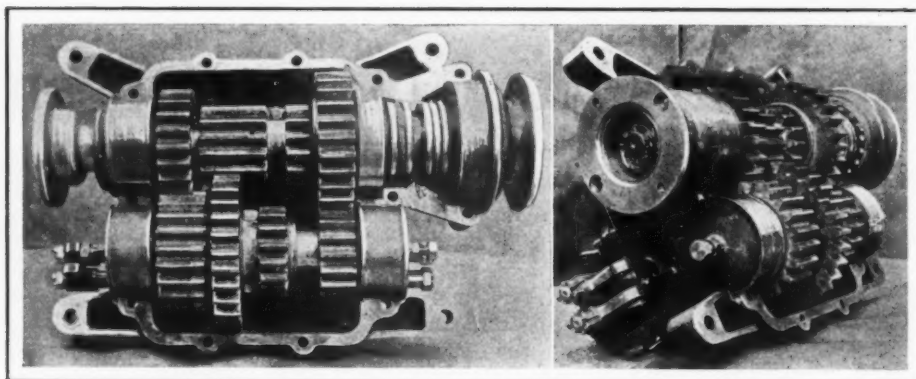
Has Constant Mesh Gears

Before the war practical tests were carried out with various types of gearboxes. These proved the superiority of a patented type of gearset known as the Dux in which the gearwheels are in constant mesh and engagement for each combination is obtained by internal gears. The sliding member on the engine shaft incorporates in itself two gears which mesh with first and second gears on the layshaft. The faces of these teeth are long enough to allow of their being moved in both directions to clutch with the internal teeth of the members for obtaining the third and the direct drive without allowing the gears on the layshaft to come out of mesh. Gear changing is easy; also, all the forward gears engaging with internal teeth which are close to their supporting bearing, there is no bending moment in either the main or the layshaft and the gears remain silent. Both three and four speeds have been used. The former are sufficient for city work, while the fourth gear has been found preferable for army service. Rear axle construction has undergone no change, this being of the internal gear type incorporating Hotchkiss drive through semi-elliptic springs having a face width of 6 in. Rearwheel brakes are formed of hard wood blocks on the internal gear drum. Foot brake is external contracting type with cast-iron ribbed shoes.

Weed Out Wood Wheels

As the result of war experience the Paris Bus Co. has decided on the use of cast steel in place of wood wheels. A few of these latter have gone into service, but this is only to use up stock. The war department will no longer take wood wheels and the company has also concluded that the cast steel type is preferable for city work. Both front and rear wheels have eight spokes, and are fitted with single band tires in front and twins at the rear.

Before the war there was considerable complaint about the mud-flinging propensities of Paris buses. To remedy this evil a public competition was held, with a view to finding some more efficient guard than the square leather splasher suspended from the hub-cap of each wheel. This competition proved the value of a rubber ring, with a face depth of about 2 in. and the same diameter as the tire, attached to the wheel with a gap of about a couple of inches between it and



New gearset with constant mesh pinions adopted by Paris Omnibus Co.

the tire. The device, which has been patented, has been adopted by the company for all its vehicles. The improved method of fitting it is to have the steel rim sufficiently wide

to receive the rubber ring with the necessary gap between it and the tire. This device is indestructible and cuts down about 75 per cent of splashing.

There has been a certain attempt at streamline forms in the new bodies. Instead of the dash being vertical, it is of the cowl type, giving the driver the maximum amount of protection. The roof is domed and forms an unbroken surface from the driver's cab to the end of the rear platform. Side windows are bigger and interior fittings are lighter. Acetylene lighting from gas contained in cylinders has been abolished in favor of electricity.

A glance at the accompanying illustration discloses, on the whole, lines and proportions which are bolder and more pleasing than any seen before in omnibus design.

Conflict with Previous Report on Paris Omnibus Construction

On the authority of *Engineering* of London it was stated in a recent article on Paris omnibuses that the two types of chassis, the Schneider and the De Dion-Bouton, which had been gradually developed before the war, and have been found very serviceable during the war, were to be reproduced in all their essential features for the resumption of omnibus service in Paris, and brief illustrated descriptions of these features were therefore presented, deriving their interest largely from the unusual indorsement implied in the re-adoption of them without material changes. But now comes Mr. Bradley, the competent and well-known correspondent of *THE AUTOMOBILE* in France, and calls attention—in the foregoing account—to some very important changes in the new series of De Dion-Bouton omnibuses which are finally to replace the old ones in the new city service, and the information seems to imply, moreover, that these omnibuses of changed design will largely replace the Schneider omnibuses, which were before in decided majority.

Sharp competition between the Schneider and the De Dion companies, or complete absorption of the large Schneider works in military matters, would seem to be at the bottom of the discrepancies in the reports, but Mr. Bradley's version is doubtless the correct one, as well as more in accordance with what would be expected of the progressive Paris omnibus company, which has never shown any inclination before to rest on its oars. The new change-gear, in which clash is avoided by means of internal-gear clutch pinions with wide-faced teeth, which maintain continuous mesh independently of gear changes, is a departure more than ordinarily significant, the new arrangement demanding much less skill of drivers than the older construction.

The change from wood to cast steel wheels is also nothing more than could be expected, since the same tendency is observed even in this country where the supply of suitable wood is much more dependable.

Cylinder Scores Filled With Nickel

IN order to avoid the necessity for reboring or regrinding cylinders, which are slightly scored by loose pistons or loose wrist pins, a new process is coming into use. The scores in the cylinders are filled with a nickel alloy which is smoothed down to the inner wall of the cylinder and is permanently welded in place. In working with this composition not enough heat is applied to warp the cylinder walls and therefore the necessity for reboring and regrinding is eliminated. The Wilkes-Barre Welding Co. of Wilkes-Barre, Pa., are making

a specialty of this work, the cost of which is not high. By the same method repairs can be made on complicated breaks in crankcases, cylinders and housings, if these are made of cast iron, steel or aluminum.

Validity of Mortgage on Dealers' Cars

WHEN a company sells automobiles to a dealer and takes notes secured by a chattel mortgage, the mortgage is not valid in Texas if the automobiles are to be exposed for sale by the dealer in the ordinary course of his business.

The agent of a certain make of automobiles at Houston, Texas, gave a written order for six automobiles and agreed to pay \$9,651 for them. Thereafter an ordinary chattel mortgage was given covering the purchased cars. Some time later the dealer sold one of the cars to a man who re-sold it. The company finally had a writ of sequestration issued and the car was seized.

The court held that the company had no right to seize the car under the chattel mortgage, as it had not reserved title to the cars and that, as it had been contemplated they would be exposed for sale by the dealer in the ordinary course of his business, the agreement was invalid. The car owner was therefore allowed \$850 as damages against the company for the car which had been taken from him.—(*Case vs. Lipper*, 181 S. W. (Texas) 236).

Accident Liability Voided

Where an automobile insurance policy issued to a manufacturer of automobiles requires notice to be given of all accidents, the fact that the superintendent of the company, after investigating the report of an accident made to them by an attorney, believed that no accident occurred and failed to notify the insurance company, will not excuse the failure of the automobile company to give the required notice.

Suit was brought by an automobile manufacturer against an insurance company under an automobile liability policy and also for the amount of damages paid by the manufacturer in satisfaction of a judgment against it for personal injuries.

The accident out of which the claim arose occurred as the result of a horse driven by a woman becoming frightened at one of the manufacturer's automobiles which was being tested. Judgment was recovered against the manufacturer on the claim and reimbursement was refused by the insurance company.

The court relieved the insurance company from liability.

Paragraphs on Current Topics

By Marius C. Krarup

Motto: Radical Thought, Conservative Action

Considering that profits are mostly spent in making life more picturesque and interesting for the maker of them, there would seem to be a shorter road to final results in occasionally going in for an unproved side issue in the routine of manufacture and taking a sporty view of the possibilities for profit. But the stockholders' expectations stand in the way of thus humanizing success and getting its rewards before retirement, in the form of new sensations and achievements, and for this reason the participation of the automobile industry in aviation—now so widely expected—and in the improvement of agricultural motor tools and implements must probably take place entirely through new corporations under a predominating personal control. One-man power is apparently still indispensable to make business a picturesque occupation.

□□□□

Since one still hears the question asked whether it is expensive to run an automobile, it is not yet too late to answer it with another question: Does it cost something to travel, or have your family travel, about 3000 miles every month at an average speed of 30 m.p.h. and to blow your friends and neighbors to sumptuous suppers at the road houses? Answer: With six up, about 8 cents per mile; suppers *ad lib.* By reducing speed to 15 m.p.h. no gasoline is saved, but the mile comes down to about 4 cents and the friends get scarcer, the meals plainer. The six persons, more or less, lose theoretically 100 hours per month, which may be profit or loss, according to their habits. In real life, however, they lose

1500 miles and gain the cost of them, while seeing more, exercising more and making more new friends with cars of their own.

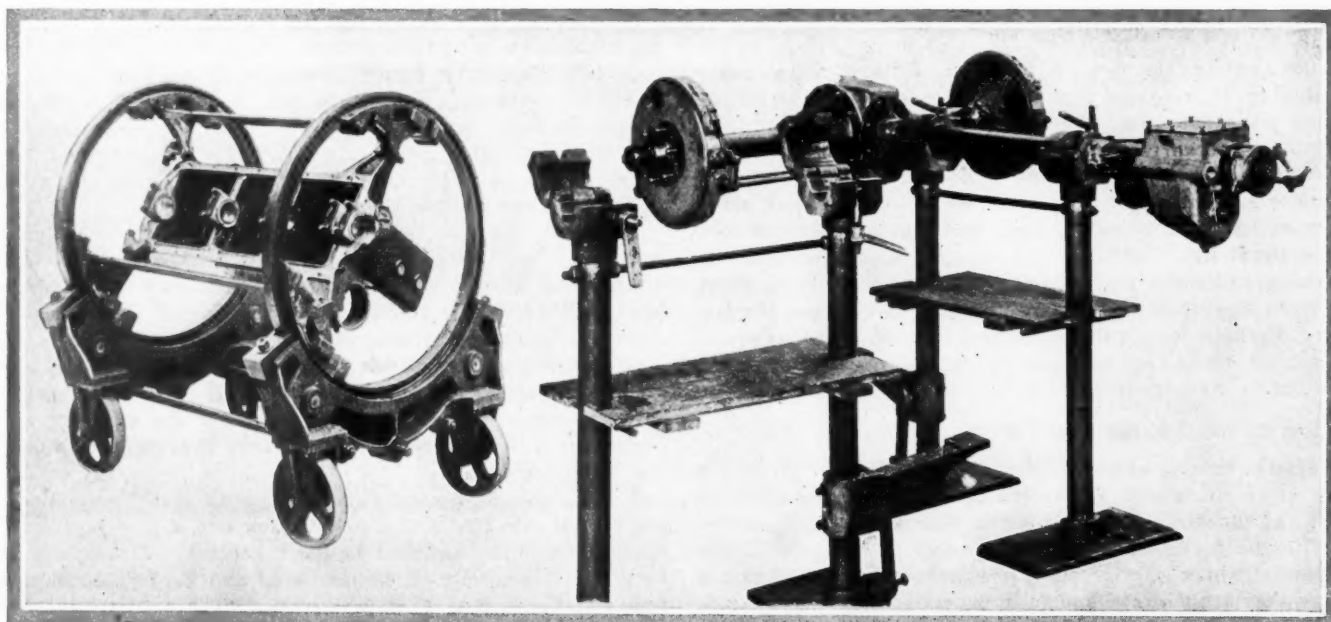
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A sensitive paragrapher finds it disgustingly snobbish to advertise that "Success Rides in Closed Cars." But he underestimates the ad-writer's shrewdness and philanthropy. The real parvenus are not numerous enough to bother with. The dart is aimed at the multitudes who need a hint to help success along. It conveys a business-like suggestion for their benefit. And were it snobbery, how and in what category should deliberate and professional snobbery be classified, having a laugh up its own sleeve? Whatever be the ethics of it, the sentiments of an ad-writer must be vicarious and tolerant, like those of a constitutional monarch, an actor or of any other victim of civilization who "represents" somebody or something.

□□□□

Willis A. Gibbons writes on "Skin Friction of Various Surfaces in Air" in *Aerial Age* of June 26. Nap on cloth causes considerable additional friction, but a smooth surface, such as that of tinfoil, does not in all cases mean a reduction of it. These test results, contemplated with some imagination as to what they may ultimately signify, are perhaps as worthy of attention as the projected Aerial Derby—the "proposed aviation classic," as Secretary of the Navy Josephus Daniels terms it, with generous anticipation.

Facilities in Assembling of Marmon Cars



A special engine stand (at the left in the illustration) and a special rear system stand are used in the assembling of Marmon 34 cars.

The engine stand is constructed of gray iron castings and is mounted on four wheels so that it can be very readily moved. The engine can be turned in any position in the stand. The aluminum casting is first bolted into it and the

other parts of the engine follow till the unit is complete.

The other illustration shows two rear system stands—one open and ready to receive the torque tube and the other with the rear system mounted and clamped in place. The arm extending from one of the uprights has a spring arrangement by which the center piece of the rear axle is held in line with both side housings for insertion of through bolts.

The FORVM

Two-Cycle Superior to Four-Cycle in Performance

By Chas. E. Duryea
Consulting Engineer

HAVING spent much time and money experimenting with two-cycle engines and knowing by actual results that the two-cycle can be very satisfactory on all points and compare favorably with the four-cycle, I dislike to remain quiet when incorrect views concerning the two-cycle engine are expressed. If the man who thinks the two-cycle cannot handle its charges for lack of time will extend his exhaust ports well around the cylinder he will find he need not open so early as does the four-cycle exhaust valve and that he can run with fair power up to 3000 r.p.m. or over. Nor is there a high heat flow to the cooling jacket. On the contrary, the two-cycle lets its hot gases get out quickly and cool gases enter and absorb the flash of heat before it gets far into the wall. A two-cycle will cool easier than a four-cycle on this account. That a two-cycle is not efficient at full power is largely true but automobile engines seldom work at full power and at part power the two-cycle is more efficient than the other because of the constant compression.

Crank bearings can easily be fitted with stuffing boxes if one is really anxious to hold the crankcase compression. Having but about one-fifth the number of parts that the four-cycle has, we may add many and still have much advantage. But this is not necessary. Splendid two-cycles can be made with very little complication.

Flexibility and Two-Cycle Engines

That they are not flexible is another fallacy. First define flexibility. If we mean that motor is most flexible which develops least power at 300 r.p.m. and most power at 3000 r.p.m. then the four-cycle is winner, but that is not my definition. For automobile use I need a motor which will pull like a mule at 300 r.p.m. and yet be able to speed along over perfect roads at 3000 r.p.m.; and that is just where the two-cycle shines. It takes full charges at low speeds and develops surprising power for mud, sand and hills where power is needed and where one does not like to use the low gear. Perhaps it is wasteful of fuel at such times. So well does it run and so hard does it pull we can afford to overlook this fault. Bad roads do not occur often, we think.

Cooling Ability Not Limiting Factor

That the cooling ability is the limiting factor either is not true, or is misstated. Air-cooled two-cycles can be made as easily as can air-cooled four-cycles. Nor is there any difference in the fuel needs. Or if there is it is in favor of the two-cycle which carries several charges in the crankcase where they are warmed and fully vaporized before passing to the cylinder. I have used crankcases so hot that low test cylinder oil vaporized. Almost any grade of fuel could be used in such an engine after it warmed up.

Every advantage is in favor of the two-cycle. It is cheaper, simpler, lighter, gives double the number of impulses, has constant compression and therefore higher efficiency, except when forced to the point of crowding its new

ADVANTAGES OF TWO-CYCLE ENGINE COMPARED WITH FOUR-CYCLE—EXPERIMENTS ON TAXICABS SHOW DIFFERENTIAL TO BE NECESSARY

charge out with the old, is more compact, less noisy and has much less internal friction. Many folks think it will not idle, but if one will shut off the fuel or sparks so that half the strokes are idle ones as in the four-cycle it idles even better than the four-cycle. But with every one pushing the four-cycle, the two-cycle like air cooling has a hard time to find buyers. There were almost as many new automobile buyers last year as old users. Can you blame them if in their inexperience they followed the crowd and bought the oldest and best known kinds, even if not so good? But men who know better things should not remain silent.

Taxicab Experiments Show Differential a Necessity

By L. P. Prosson

I HAVE been reading with great interest the different articles published in THE AUTOMOBILE of the possibilities of eliminating the differential in motor vehicles and as I have had quite a little experience along this line I take this opportunity to bring forth the results of my experiments.

In 1913, when I was mechanical superintendent of the Yellow Taxicab Co., I conceived the idea that it was possible to operate a vehicle without a differential and selected two good running cabs, removed the differential, locked the axles in the housings and put them in actual service.

The first day out the drivers complained that the cabs were very hard to steer and that the brakes were binding when going around corners, that the motors were laboring hard through traffic and that they preferred to go around the block instead of turning in the street.

Of course, we immediately knew the trouble, but as we wanted to carry the test further we insisted on keeping the cars in service. We told the drivers that the steering and brakes were in good condition, but they continued to report the same trouble.

After a couple of weeks' running, with many complaints, one of the cabs had a live axle broken and a few days later the same trouble occurred to the other cab. I also kept a very accurate record of the tire wear and gasoline consumption and found both to be excessive.

The result of my experiment was a failure, and I was convinced that it was impossible to operate a vehicle properly and economically without a differential and I also found that it was detrimental to the whole car.

The only time that we could operate these cabs with any degree of satisfaction was on rainy days on account of the wheel slippage being accomplished more easily.

The History of the Pneumatic Tire—8

Great Activity in the Tire Field in Both Europe
and America in Early 90's—Jeffery Clincher Tire
Patent Invalidated — Many and Varied Types

The History of the American Automobile Industry—35

By David Beecroft

THE A. Strauss cushion tire brought out in 1891, as briefly described in THE AUTOMOBILE for June 22, resembled the Duryea of 4 years earlier, in that the central cavity was of some size, while the open base was comparatively narrow, and not, as in the arched tires, wider at the open base than at any portion of the cavity. It differed from the Duryea, however, in that it fitted a crescent or arc-shaped rim, whereas the Duryea rim had in-turned edges and no other fastening, just as did the later clincher rim.

Much Activity in Early '90s

A very considerable activity existed on both sides of the Atlantic at this time. Of course, the patent record follows the actual work of the inventor by some months, representing the time required in the United States Patent Office. Illustrations of a variety of English designs were printed in American bicycle publications early in 1891. The Columbia and Union tires were brought out about this time while several of Jeffery's devices began to attract attention. His patent issued in June, 1891, shows a casing having metal hooks along its edges and actually hooking into the edges of a rim shaped to receive these hooks. The tire of January, 1892, however, omits the hooks but provides beads which are forced into the overhanging edges of the rim by a stiff base which can be lifted in the center to draw the beads closer together and remove the tire. This tire did not have the open base so desirable in a double tube tire and it was not found easy, by the various inventors, to produce a tire having a base rigid cross-wise and yet flexible enough to be lifted in the center and forced down again in order that the tire might be loosened or locked in place.

Jeffery Patent Invalidated

Jeffery's patent of 1896 shows the more common form of clincher tire and became the accepted type of that kind. The Jeffery patents were supported in the courts for some years and were believed to hold the tire in place by hook action of the bead in its engagement with the edge of the rim. As a matter of fact, this was not what proved to be the holding feature, and the patent was finally invalidated in the courts.

The feverish activity in the early '90s among tire inventors brought out a surprising number of

forms. One of these, by Welch, an Englishman, was adopted by the Dunlop makers in England and was independently developed and patented in this country by Brown & Stillman in 1892. This form used a rim deep in the center but shallow at the sides, forming supports for the edges of the tire casing, which edges each contained an endless wire. To apply the tire, the wired edge was pushed into the center of the rim and thus a sufficient slack gained to bring the last portion over the extreme top of the rim edge, after which the wired edge was brought out against the rim edge, the air tube inserted and the other edge of the tire applied in the same manner. Once in place, the tire could not get off unless the wire broke, but could easily be removed by reversing the process. This form of tire is largely used in automobile work to-day, and is called the straight side tire to distinguish it from the beaded side or clincher type rims with a removable side ring displacing the original type with depressed center.

Stretching Fabric Weakened Tire

Since the endless wires of this straight side tire hold the tire to the rim, and since the shape of the rim prevents the base from spreading, the holding function of the fabric is performed by the cross-wise threads of the fabric rather than by the lengthwise threads. It is impossible to make a constrictive open tire where threads are broken. In the constrictive tire the reverse was true. In order to insure the tire remaining on the rim, the fabric had to be stretched in such a manner that, when inflated, the tire would shorten, and this shortening effect caused great strain lengthwise on the fabric. This strain was objectionable from two standpoints: it tended to cause the tire to burst more quickly because it was already under considerable tension, and passing over an obstacle, threw more strain on the already strained fabric. Second, this fabric, already taut, could not stretch and yield enough to swallow the obstacle, so the wheel is necessarily lifted, which strains both the tire and the mechanism, and is uncomfortable for the passengers. With the wire-edged tire, the fabric could be rather long for a given rim size, and therefore loose and free to yield longitudinally. It therefore could pass over an obstacle without lifting the wheel or straining the fabric so much.



The Rostrum

Would Build Roads Like Railways

EDITOR THE AUTOMOBILE:—The number of automobiles is steadily increasing and likewise the number of accidents, but over 80 per cent of all accidents are the direct result of easily preventable causes. Many preventable accidents can only be prevented by the adoption of a broad and comprehensive system of road operation similar to railroad traffic operation, in which a definite responsibility is recognized as residing in the corporation, state, or town, as well as the automobilist.

In the congested parts of our large cities the traffic is directed by the police and by signs on one-way streets and in the country a few roads, notably State roads, have inadequately posted warning signs and directions, but all through the great number of our country roads there are no warnings whatever to apprise a motorist that he is approaching a dangerous curve, cross road, bridge or other perilous place.

Up to this time the responsibility for nearly all automobile accidents has been laid at the door of the operator of the machine, which is unjust. It is no more right to hold automobile drivers down to 20 or 25 miles an hour in open places than it would be to hold passenger trains down to that limit of speed, if all things were equal as they should be.

A Comparison of Conditions

This brings me to a comparison of the conditions of railway and automobile traffic. Railroad trains travel on a right of way granted them by the State and the State requires them to erect and maintain suitable and safe bridges, viaducts, railroad and wagon road crossings, signs, signals, fences, turnouts, switches, gates or tell-tale bells, flagmen, etc.

Automobiles travel on public roads that also belong to the State, county or town, but with the exception of a few very inadequate signs on some roads, giving warning of dangerous curves, railroad crossings and schools, there are no safeguards erected, no signals or signal lights, no tell-tale bells at hidden crossings, no flagmen or gates except those provided by the railroads where their line is crossed by the carriage road and none whatever where any of the innumerable country roads cross each other.

From early times the law has held the city, town, country or state liable for damages resulting from defects in the roadway, bridges, viaducts, etc., just as it holds the railroads liable for similar defects and in the case of the railroads it includes lack of proper gates, signals, flagmen, etc.

Proper Equipment Required

The proper equipment to meet the requirements of present-day traffic on our common road truck lines or principal state roads would consist of nearly all the appliances in use on railroads, in the line of signals, sign boards, flagmen and tell-tale bells, besides other safety devices not applicable to railroads, owing to the difference in the construction and operation of the two roads.

Take for instance a heavily traveled main road between two large cities much used by automobiles. All the roads crossing or branching from this road, where a clear view is obstructed, should have tell-tale bells set up at such crossings or junctions, automatically constructed to be electrically rung as on railroads, by the passing of any vehicle over

the main roads, bearing always in mind that an automobile may very likely have a velocity equal to an ordinary express train.

It would be perfectly practical to arrange this by having a transverse steel bar set across the roadway in the hard surface of the roadbed, which the wheels of any vehicle would depress sufficiently to make an electrical connection and so ring the bell at the crossing or junction when a quarter or half a mile away.

Double Track All Curves

Another safeguard that is imperatively demanded is to double-track every road used by automobiles at all curves where the view is at all obstructed by fences, buildings, or shrubbery. This should be done by building a stout, low fence, longitudinally in the middle of the road around such curves, thus confining the traffic to the right-hand track in both directions and so preventing collisions. This fence should be provided with large signs at each end, directing all vehicles to take the right-hand track, and with red lanterns at night.

The same precautions should be taken at all small hillocks over which the road may run, where the grade is so high as to cut off the sight of an automobile or other carriage on the further side of the rise.

I have several times barely escaped a smash-up in both of such places, for, while you may be keeping close to the right-hand side of the road, the other driver may very likely not do so.

A most reprehensible method of earth road construction, quite common in many places in the rural districts, especially in the West, should no longer be tolerated. This is the practice of using road scrapers to plow up the soft mud and grass roots from the sides of ditches and depositing it in a high ridge in the center of the roadway. I have seen and ridden over roads that were built in this manner, that were crowned as much as four feet in the center and so narrow and steep that the gearboxes plowed a furrow in the top when straddling the center and with such steep sides that it was impossible to turn out when meeting a team without tipping over or going into the ditch.

The construction of such a road should be deemed a misdemeanor. A consideration of these matters forces the logical conclusion that our main arteries of automobile travel should be treated like railroads, for the safety of travel and should be equally well protected as far as is possible, and the state, county or town owning the road should be legally liable for all accidents occasioned by dereliction in their duty to the traveling public, even as a railroad is so held.

Chardon, Ohio.

J. FRANCIS LE BARON.

Installing Ammeter on Oldsmobile

Editor THE AUTOMOBILE:—I have a 1915 Model 42 Oldsmobile and wish to install an ammeter. Will you kindly tell me how to do this?

2—Will you please publish a wiring diagram of the electric system on this car?

New York City.

R. W. DE V.

—To install an ammeter on a 1915 Oldsmobile the instrument should be mounted at a convenient place on the dash instrument board, and the wire running from the No. 1 post on the switch should be cut and the cut ends of the wire should be connected to each of the connecting posts on the ammeter.

2—Wiring diagram of 1915 Oldsmobile 42, appears in Fig. 1.

Operation of Dual Exhaust System

Editor THE AUTOMOBILE:—How does a dual exhaust operate?

2—Is rain water better than hard water for use in a radiator?

3—In lubricating the spring leaves, how far can they be spread before danger of breakage?

4—Describe the operation of burning carbon out of cylinders.

West La Fayette, Ind.

A. H. R.

—You are probably thinking of the design of exhaust manifold fitted to a few four-cylinder engines. In these the four exhaust ports are connected alternately to a pair of pipes which are often integral in a single casting. The two passages become one at the point where the exhaust pipe is attached. The idea is that if cylinder No. 1 has just exhausted and cylinder No. 3 is the next in order it is an advantage to prevent the exhaust from No. 1 from interfering in any way with the exhaust from No. 3. If No. 3 exhaust passes into a separate passage the effect of the exhaust from No. 1 passing down the exhaust pipe may actually exert a suction on the exhaust from No. 3, whereas with the ordinary manifold it can create a back pressure. Thus a dual exhaust consists of dividing the manifold so that the four cylinders exhaust alternately first into one passage in the manifold and then into the other. The same system is sometimes used on six-cylinder motors, using an exhaust pipe for each block of three cylinders.

2—Yes, because containing no lime it can throw down no deposit in the cylinder or in the radiator.

3—To lubricate spring leaves the car should be jacked up

by the frame and not by the axle. Lifting the car by the frame will cause the spring to expand, and when the wheel is off the ground the weight of the axle will tend to pull the spring open. Under these conditions the leaves can be spread apart quite wide. Exactly how far apart it is safe to spread them depends upon the design of the spring and a great many other factors. The best way to lubricate the leaves is to use an old steel table knife which can be dipped in the grease and then rubbed between the leaves and you will find it is only necessary to spread the leaves a very small amount to allow the knife to be inserted. The less the leaves are spread the better it is for the spring.

4—The carbon which is deposited in the cylinders will not burn in air, but it will burn in pure oxygen gas. The operation of burning out cylinders is to direct a jet of oxygen gas into the cylinders. At the commencement of the operation a little ordinary gas is injected also. This burns in the oxygen and quickly heats the carbon to a point where it begins to burn by itself. The gas is then turned off and oxygen alone is fed, the carbon continuing to burn until it is entirely consumed. Directly the carbon is burned off the cylinder or piston, combustion ceases, so very little heat is generated.

Safety Fuse May Be Burned Out

EDITOR THE AUTOMOBILE:—Kindly publish information for model OB 2916 magneto and generator on a model R 1914 25-hp. Reo.

The ammeter, with the car running and lights out, shows 2 amp. discharge; with lights on it shows 6 amp. discharge. With the engine idle, ammeter is at zero. The brushes and commutator have both been cleaned without any satisfactory results.

Danbury, Conn.

S. M. P.

—The difficulty can be located by ascertaining whether the safety fuse on the generator has burned out, also see that the terminals are securely fastened to the terminal posts as well as seeing to it that the terminals are securely fastened to the end of the cables.

This trouble is most likely to be found in the fuse or the

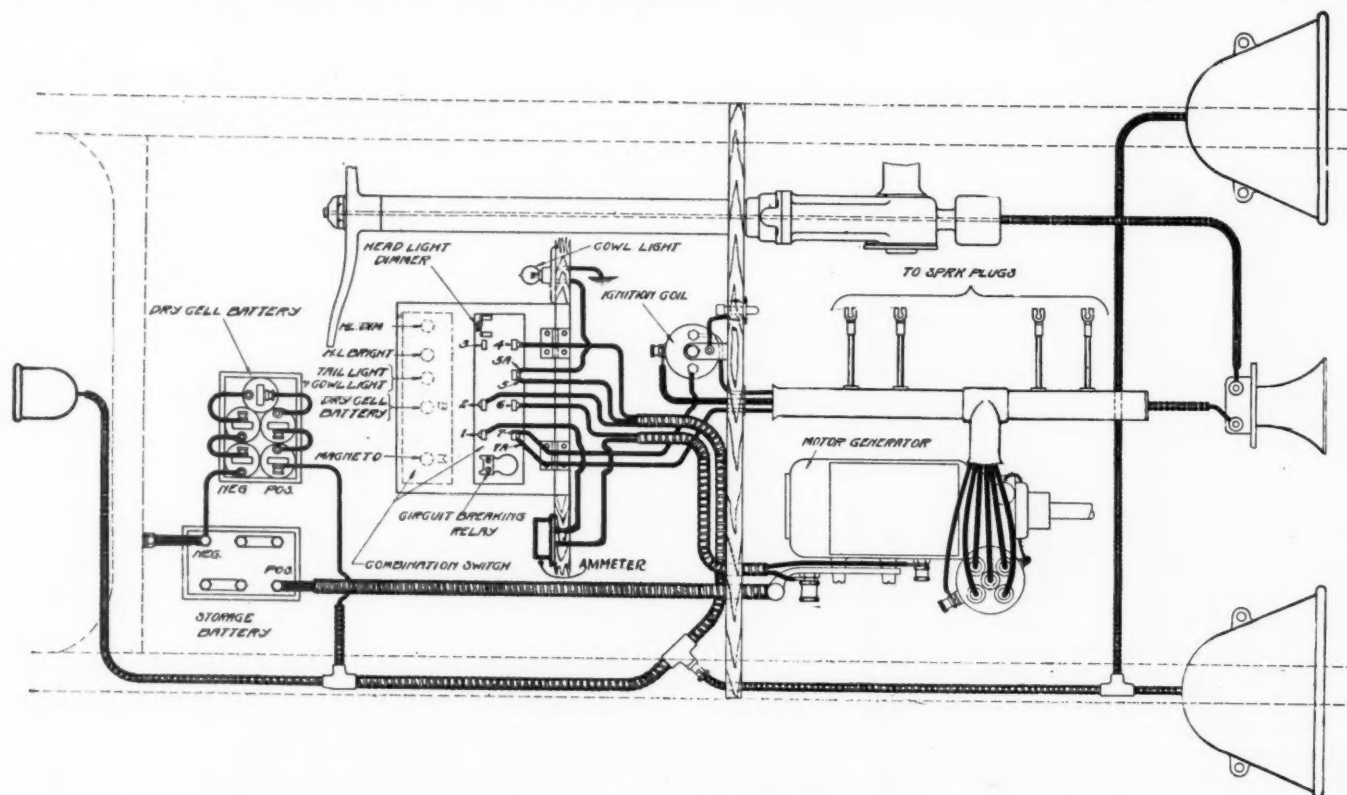


Fig. 1—Wiring diagram of electric system on 1915 model 42 Oldsmobile, showing where to install an ammeter

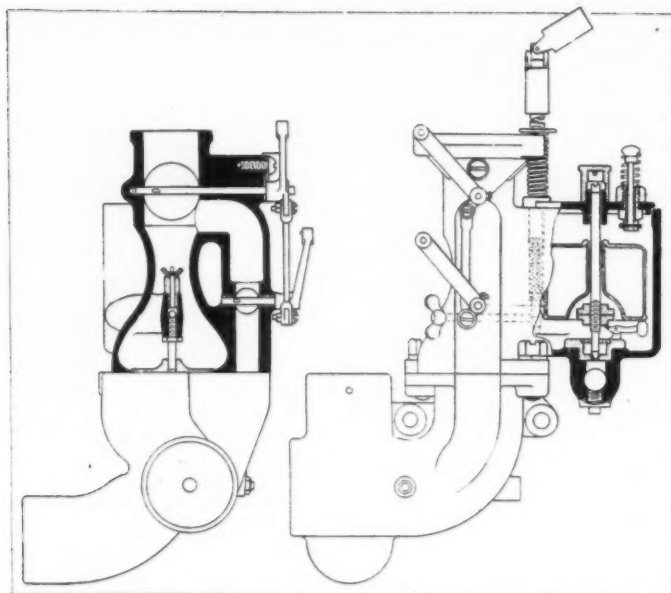


Fig. 2—Sectional views of carburetor used on Franklin

terminal being loose on the top of the generator or cable or at the brushes. It would also be well to inspect the armature for an open circuit and also the field circuit.

The 2-amp. discharge shows the amount consumed for ignition and the 6 amp. shows the consumption of lamps and ignition.

Description of Carburetor on Franklin

EDITOR THE AUTOMOBILE:—Kindly publish full description, including illustration, of the carburetor used on the Franklin car.

2—What weight would you give to the factors of carburetor design, air cooling and low bearing friction, influencing the remarkable economy developed by this machine?

3—Which is better practice, to make a hill on high at 12 m.p.h. requiring full throttle, or to go into second, making the same speed with a smaller throttle opening?

Miami, Ariz.

W. W. J.

—Fig. 2 shows the carburetor used on the Franklin car. Its construction and principles of operation are evident from the illustration except that the needle valve control of the gasoline is carried to the dash where it may be adjusted to suit conditions as they arise.

2—Air cooling and a high over-all efficiency have more to do with the mileage obtained with the Franklin car than has the carburetor design. It is difficult to give any absolute figure of the relative effects of the three points mentioned.

3—It is better to go over a hill on high at 12 m.p.h. with wide open throttle if this condition maintains only momentarily. If the grade is long enough to require continuation of this condition for any length of time we believe the car will be better off by making the hill on second gear.

Locating Cause of Power Loss

EDITOR THE AUTOMOBILE:—Will you explain to me how to remedy loss of power in my 1915 Hupmobile? The cylinders all work fine and would pull any hill on high until about a week ago. Now I have to use second on the same hill that it would pull on high. On the level it runs as fast as ever.

Blackstone, Va.

R. I. S.

—Check the adjustment of the valve tappets closely. See that you have at least 0.004 in. clearance between the valve tappets and the valve stems. See that the valves are seating perfectly and are not pitted or corroded. Test the compression of the motor by attaching the hand crank and rocking the motor against compression on each cylinder consecutively.

Should you find one that is weaker than the other we would suggest that you immediately endeavor to locate the point of leakage. If you find that the compression is leaking past the piston rings, this, of course, can be remedied by the installation of new piston rings.

See that the motor is entirely free from carbon and that the spark plug electrodes are set 0.020 to 0.022 in. apart.

Be sure that the Atwater Kent header points are perfectly clean and are not pitted or corroded. See that they are adjusted to between 0.010 and 0.012 in. and that they meet squarely.

See that the carburetor and gasoline feed line are entirely clean and not obstructed in any way.

Ascertain that the clutch is not slipping and that the brakes are not dragging.

Information on Norwalk Underslung

EDITOR THE AUTOMOBILE:—Will you kindly publish a list of all Norwalk underslung type cars manufactured, showing model, number of cylinders, developed horsepower, and if possible, the bore, stroke, wheelbase, starting and lighting system and size of wheels.

Also please let me know about what date you figure engine No. 97 was built and where I may obtain parts for these cars. I understand that the reorganizers of the company are at present manufacturing practically the same type of car under a different name. Is this so? If so, what is the name of the company and where are they located?

New York City.

W. A. T.

—Herewith is a list of all Norwalk underslung cars. All used six-cylinder engines.

Bore Stroke W.B.							
Model	Hp.	In.	In.	Start	Light	Wheels	
1912-6	60	4	5	136 Elec.	Apple	40 x 4 1/2	
1913-A	50	3 3/4	5	127 G. & D.	G. & D.	38 x 4 1/2	
1913-A Special	60	4	5	131 G. & D.	G. & D.	40 x 4 1/2	
1914-1915 D...	60	4	5	131 Wsthse.	Wsthse.	38 x 4 1/2	
1915-C	70	4	5 1/2	136 Wsthse.	Wsthse.	39 x 5	

Abbreviations: Wsthse., Westinghouse; G. & D., Gray & Davis.

Engine No. 97 was built in 1912 model six, and parts can be obtained from the Norwalk Motor Car Co., Martinsburg, West Va., at the present time. The model C and D with minor improvements and refinements are being built, together with model F.

Making Gage for Gasoline Tank

EDITOR THE AUTOMOBILE:—I noticed in a recent issue of THE AUTOMOBILE an inquiry about the depth of gasoline for different amounts in a cylindrical tank. Wanting to make a gage for my fuel tank, I made the following tables coefficient for certain aliquot parts of tank capacity.

For 10 or 20 gal. tank		For 15 gal. tank	
1/20	0.19442	1/15	0.23677
2/20	0.31291	2/15	0.38205
3/20	0.41481	3/15	0.50808
4/20	0.50808	4/15	0.62488
5/20	0.59592	5/15	0.73500
6/20	0.68021	6/15	0.84213
7/20	0.76203	7/15	0.94766
8/20	0.84213		
9/20	0.92125		

Now, for example, let us consider the Ford tank which is 10 in. in diameter and holds 10 gal. very nearly. For each aliquot part of 10 gal. multiply the corresponding coefficient by one-half the diameter. This gives:

1/2 gal. depth	0.972 in.	3 gal. depth	3.401 in.
1 gal. depth	1.565 in.	3 1/2 gal. depth	3.810 in.
1 1/2 gal. depth	2.074 in.	4 gal. depth	4.211 in.
2 gal. depth	2.540 in.	4 1/2 gal. depth	4.606 in.
2 1/2 gal. depth	2.980 in.	5 gal. depth	5.000 in.

For a 15 gal. tank use the other table and multiply by one-half the diameter.

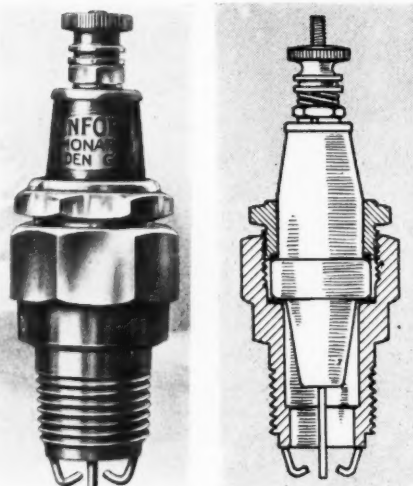
Port Clinton, Ohio.

W. B.

ACCESSORIES

Golden Giant Spark Plug

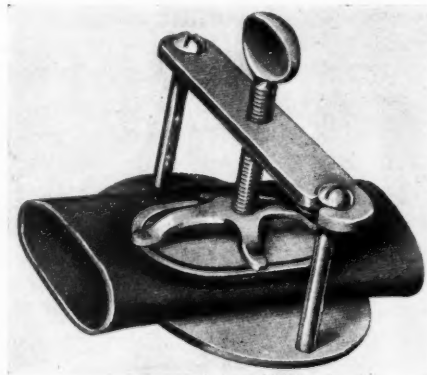
THE manufacturer of this plug has combined the results of 14 years of experience in spark plug manufacture in the Golden Giant, which is illustrated herewith. Although the most striking exterior feature of the plug is that the shell is durably plated with 24-karat gold, there are a number of points in the interior which denote the serviceable design and excellent material and workmanship characterizing the construction. A special insulation called blue adamant is used in connection with copper asbestos gaskets made by a special process and a strongly built shell. The bushing is nickel. Electrodes are of pure nickel, insuring delivery of a spark under all conditions. The manufacturer guarantees each plug unconditionally, the guarantee stating that the plug may be returned to the factory at any time if found unsatisfactory and it will be repaired or replaced free of charge. The company co-operates with both dealers and jobbers with all sorts of dealers' helps, such as wall posters, size cards, display cartons, window cards and trims, etc. The plugs are made in all sizes and are packed in individual tin cartons. They sell for \$1 each.—Benford Mfg. Co., Mt. Vernon, N. Y.



Exterior and section of Golden Giant spark plug, showing construction



Ralston truck attachment for Fords



Safety vulcanizer for inner tubes

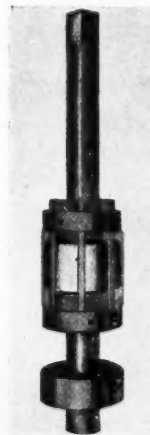
semi-high speed steel. Loosening the top nut and screwing up the bottom nut makes the reamer cut larger; there is an adjustment of $\frac{1}{8}$ in. The shaft extending through the reamer, which is more than the length of a cylinder, has a taper guide which sets in the bottom of the cylinder, forcing the reamer to cut the cylinder perfectly straight. The makers state that the reamer will not chatter or buck. It is turned by means of a tap wrench 36 in. long, or it may be used in a drill-press; it is not intended for lathe use. Two men can ream a set of cylinders in 25 min. The reamer lists at \$30.—Chadwick & Trefethen, Portsmouth, N. H.

Safety Vulcanizer

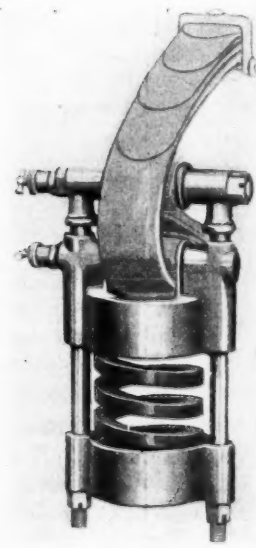
This tube-patching vulcanizer consists of a circular plate, carrying rods which support a yoke through which a clamping screw is threaded. Horizontal arms on the end of the screw press the patch on the tube. A piece of prepared fuel is placed on the patch and ignited with a match. When the fuel has burned out the patch is vulcanized, the time required being 5 min. The outfit consists of the clamp and a dozen patches, together with the prepared fuel. Price, \$1.50.—Safety Vulcanizer Co., Mason City, Iowa.

Alisco Shock Absorber

The Alisco shock absorber is of the auxiliary type and is easily adjustable to its load, being unusually well provided with means for guiding its movement. The device is of the open type. Connection between the upper and lower parts is by means of two steel rods; the upper ends are fast in the upper spring shackle fitting and the lower ends pass through the bottom casting and are held by nuts which can be tightened or loosened to provide the proper spring tension. The upper head slides on the rods, which thus constitute guides so widely spaced



Chadwick & Trefethen cylinder reamer



Alisco shock absorber

Ralston Ford Attachment

To change a Ford into a satisfactory 1-ton truck a special frame, rear wheels, axle and springs are supplied, forming a complete unit which is attached as a rearward extension of the Ford frame. The Ford rear axle and wheels are removed; the rear axle is bolted to the frame extension, sprockets are attached in place of the wheels and chains are run to the sprockets on the new rear wheels. The front of the extension frame is attached to the Ford frame near the front; the rear end of the Ford is attached to a cross member of the extension frame. The greater part of the load is carried on the rear wheels, the front wheels carrying only their normal load. Weight of complete converted chassis, 1850 lb.; weight of attachment, 900 lb.; axle, 2 by 2½ in.; tires, 32 by 3½ solid; wheelbase, 124 in. Price, \$350.—Curry & Rowe, San Francisco, Cal.

Chadwick & Trefethen Reamer

With this reamer the cylinders of Ford and Dodge Bros. motors can be re-finished. It is of the shell type with taper slots fitted with eight blades of



Telescope apartment—it is a complete touring outfit, being practically an entire house on wheels

as to give adequate support. All the bearings are long and are provided with grease cups. Price, \$18 per pair.—Allen Iron & Steel Co., New York City.

Telescope Apartment

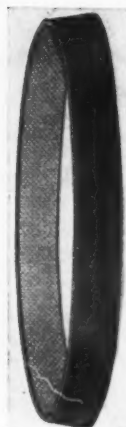
This touring apartment is a complete house on wheels. It is extremely light, however, and is designed particularly for Fords. It is box-like in shape with rounding sides and top and displaces the tonneau. There is a mattress on the floor of the compartment large enough to hold three people and when desired, this bed may be pulled back so that it extends out into the open and thus provides perfect ventilation on the hottest nights. There is a collapsible dressing-room which may also be used for shower baths. In cold weather it may be heated by a special heater attached to the exhaust which also furnishes hot water for bathing. Cooking utensils, food and a stove are carried in a cabinet on the left side. The side of the cabinet is hinged so that when it is opened it forms a table. The opposite side has several drawers which are used for storing clothing. These two cabinets slide laterally so that in the daytime they occupy part of the interior. At night they are pushed out so that this space may be used for sleeping. Price, \$100.—Gustav de Bretteville, Seventh and Brannan Streets, San Francisco, Cal.

Ideal Tourist Shovel

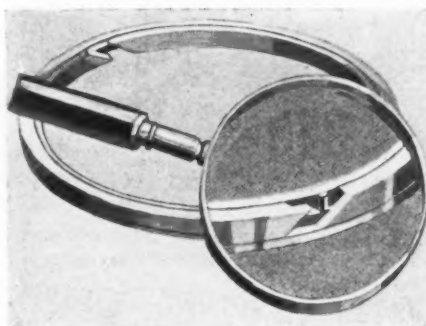
This all-steel shovel has a telescoping handle and is particularly suitable for automobilists driving in rough country or camping. The blade is 6¼ by 8½-in., the length of the handle 16 in. and the weight 2 lb. After the handle is extended it is locked by turning two lock rings. It is nickel plated.—Ideal Mfg. Co., North Kansas City, Mo.

Advance Overhead Fountain

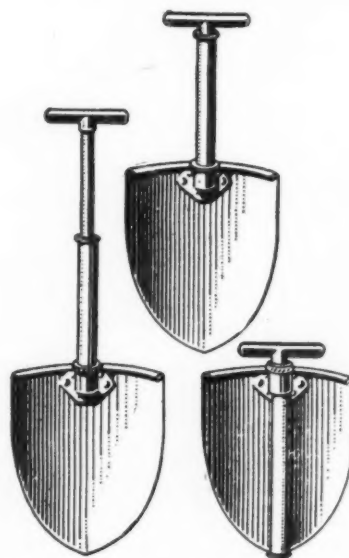
The feature of this overhead washer is that it effects a saving of 50 per cent in the amount of water used because the water is automatically shut off as soon as the hose is released and turned on by



Leathertex clutch facing



Sioux piston rings, showing joint



Ideal shovel with telescopic handle

pulling slightly on the hose. The washer consists of a horizontal arm carried in a swivel joint which is part of the ceiling bracket. When the arm is up the valve is closed and when it is down, it is opened. An adjustable counterweight on an extension of the arm makes it possible to quickly adjust the device so that the weight of the hose and the arm is slightly overbalanced by the counterweight. Price \$35.—Advance Mfg. Co., Franklin, Pa.

Leathertex Clutch Facing

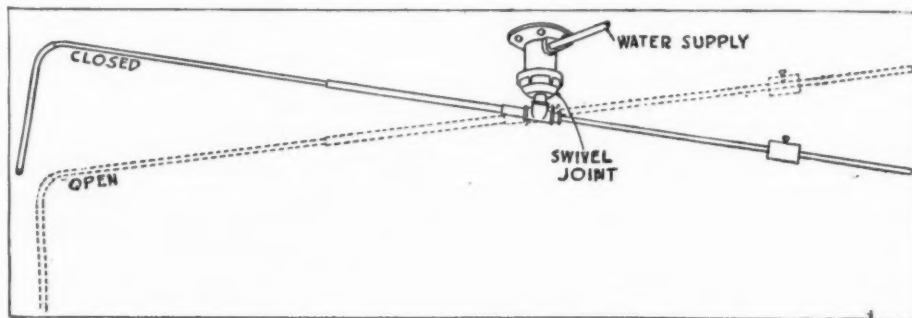
Leathertex cone clutch facings are designed to give greater durability and efficiency, being a combination of specially tanned leather and textile, the two being merged into one under 3000 lb. hydraulic pressure. The outer surface is leather and the inner surface fabric. A smooth, velvety action and unlimited wear are claimed. The company has had more than 50 years' experience in the manufacture of leather goods and guarantees that the facings will hold their shape and will not vary in thickness more than 1/100 in.—Hide, Leather & Belting Co., Indianapolis, Ind.

Sioux Piston Rings

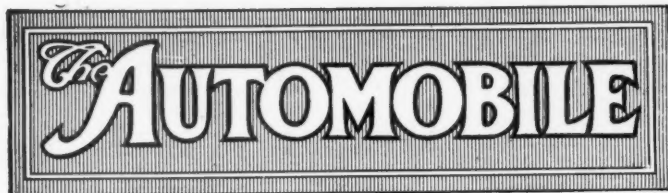
The Sioux is a two-piece ring with joints at the opposite sides. A section of each ring is stepped, the two fitting together to form a rectangle. This construction provides a comparatively long and tortuous path for any gases which may try to leak through. Price, Ford, \$1; 2¼ to 3½, \$1.25; 3¾ up, \$1.50.—Albertson & Co., Sioux City, Iowa.

Garage Door Stay

A stay designed to hold garage doors open consists of a jointed angle-steel bar with brackets at each end. One bracket is screwed to the door and the other to the frame, both at the top. When the door is closed the stay is folded upon itself. When the door is opened the stay opens and when the folding joint is straightened out it locks in position, holding the door so that it cannot swing either way. To release the door a chain is pulled, throwing the joint off center. No mortising is necessary in applying. Chains are tinned and japanned. The set includes two stays with chains and rings and four chain guides.—Stanley Works, New Britain, Conn.



Advance overhead fountain which automatically shuts off the water



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Chassis Quietness

NOT long ago it was usual for the engine of a car to be the greatest noise-producing part, but to-day there has been considerable change in this respect, and the slight sounds made by other portions are becoming more noticeable. At present, with good grade cars, the sounds made in running are mostly very small, that is the sounds produced by running parts such as gears or bearings. The constant mesh gears in the transmission are still a source of trouble, and the spiral bevel is not always absolutely silent, but a little care in inspection overcomes trouble on this score. Most of the noise to be heard in a good car is intermittent, arising from the body and from the various parts made of sheet metal.

The number of cars which can be driven over a rough road without squeaking or rattling is very small, and the tracing down of noise of this sort is very difficult, yet a trained observer could almost estimate the price of a car by being driven in it blindfold over a bit of rough road or street. Thus it is reasonable to assume that care for detail in assembly has much to do with the matter.

A body shell of sheet steel or aluminum can have either great strength or very little, great rigidity or great flexibility. We have not yet begun to study the body from a proper engineering viewpoint, we have little or no information as to the rigidity which

should be desired. It seems rather remarkable that so little concentrated study should have been given to this part of a car, that the few bodies which will stay quiet and maintain their door fits, etc., after years of use, have not been studied closely by all manufacturers, and that the *durability* of the average body is not a little better: it easily could be.

Expanding S. A. E. Activities

AT the summer meeting of the Society it was made abundantly clear that there was much work to be done in connection with the standardization of aircraft parts, especially parts of aeronautical engines and the petty details of plane construction. It may, however, be pointed out that such standardization is hardly likely to follow along quite the same lines as the automobile standardizing work already done. For one thing, the aeroplane is a much more recent product and is much further from perfection; there is little about an aeroplane that follows convention, for in air machines "convention" changes every few weeks.

This being the case, any standardizing work that is undertaken will have to be of a highly scientific character, and any committee appointment to handle the subject will have to consider fundamental reasons all the time. They will practically never be called upon to compare existing practice and strike an average, which was the method adopted for establishing many of the earlier S. A. E. standards.

Probably the amount of responsibility resting upon the aeronautic standards committee will be extremely great, and its personnel will be studied with interest when it is completed. Probably it will be found that the automobile industry has a large representation as the amount of engine work being done by automobile manufacturers is greater than might be imagined.

Excess Capacity

WHATEVER may be the result of the Mexican situation, one thing is assured, and this is that the automobile industry is ready and able to supply the utmost needs of the army. Whether it be standard types of truck, or whether special adaptations are needed, supply will follow demand with practically no delay.

It is only possible to judge by rumor at present, but there seems good reason to imagine that the army has in mind the extensive use of automobiles for the transport of troops. In Europe the motor truck and the passenger car has been used for this purpose but, owing to the number of railroads there is seldom any need to send men far by road. On the Mexican border this is not the case. Railways are few and far between, and there are only three ways of moving troops; on foot, by horse traction and by automobile.

It is distinctly gratifying to reflect that the American army, did the need arise, could collect as large a fleet of motor vehicles in a week as was got together by the armies of Europe in 6 months.

King Passes 10,000 Mile Mark

Distance Covered Long Before Close of 2-Weeks' Record Endurance Run

SHEEPSHEAD BAY SPEEDWAY, NEW YORK, June 28—Without once stopping its motor since starting on its run at 12.14 p. m. on June 15, the eight-cylinder King Model E stock car had covered 10,000 miles at 12.18 to-day. The run will be continued until to-morrow noon when the car will have been running day and night for 2 weeks, being subjected in that time to far more severe tests than it would meet in over 2 years of actual use by an owner, the average speed for the entire run being well over 32 m.p.h. as the demonstration draws to a close. For details, see page 1164.

Weather conditions have been most trying throughout the test, thunderstorms, continued rain and rapid changes of temperature, from the chill of Winter to the heat of midsummer, combining to augment the difficulties encountered. In spite of this, however, the car is gradually pulling up its speed average, the lap times varying from 2 min., 50 sec. to 4 min., the average being between 3 min., 25 sec., and 3 min., 30 sec.

To-day representatives of the companies manufacturing the various units used in the King car are assembling at the Speedway to witness the conclusion of the test.

Delling to Leave Mercer

NEW YORK CITY, June 28—It is stated on good authority that Eric H. Delling, at present chief engineer and designer at the Mercer Automobile Co., Trenton, N. J., expects to sever his connections with that company and devote his time to the development of a new car which will probably bear his name. While nothing definite could be learned about the matter it is believed a company is forming to carry out Mr. Delling's ideas. If this information is correct the new car will be anticipated with a great deal of interest as Mr. Delling is recognized as one of the foremost engineers here and abroad.

Benjamin Is Ross Sales Manager

DETROIT, MICH., June 26—The Ross Automobile Co., this city, has appointed C. Arthur Benjamin, veteran automobile man, to the position of sales manager. Benjamin's career with the industry dates back to 1898 when he took the agency for the Stanley steamer at Syracuse, N. Y. In 1900 when the Stanley was taken over by the Locomobile company, he was made Southern sales repre-

sentative. In 1902 he became salesman of the H. H. Franklin company, retaining this connection until 1906 when he became sales manager of the Babcock Electric company at Buffalo. Later he was connected with the Aerocar company, Detroit, and for 6 years following that handled the Packard in Syracuse, in 1913 becoming sales manager of the automobile department of the American Locomotive Co., now discontinued.

Humphrey Out of Chalmers

DETROIT, MICH., June 26—S. H. Humphrey, vice-president in charge of manufacturing of the Chalmers Motor Co., has resigned to take up similar duties with the Briscoe Motor Corp., Jackson, Mich. The Chalmers company has not yet appointed a successor.

Mr. Humphrey joined the Chalmers forces in April of last year, coming from the Hupp Motor Car Co., with which concern he had been connected for 2½ years. He has had a long and varied experience in his field of the industry. On first entering the Chalmers organization, he was works manager, being elected a vice-president during the early part of May of last year.

Walter Marmon Injured in Accident

NEW YORK CITY, June 26—Walter Marmon, president of the Nordyke & Marmon Co., Indianapolis, Ind., is fast recovering from a painful injury received in an accident in this city on June 17 when his car struck an L pillar on 6th Avenue, near 36th Street. Franklin Hall, a retired business man of Philadelphia and father-in-law of Mr. Marmon, died in the Polyclinic Hospital from injuries received in the accident. Mrs. Marmon escaped with slight bruises.

314 Continental Motors in 1 Day

MUSKEGON, MICH., June 24—The Continental Motors Co. established a new record at its local factory with a day's production of 314 engines one day recently. The average is 284 daily.

Schwartz Appointed Schavoir Rubber Co. Sales Manager

STAMFORD, CONN., June 22—A. J. Schwartz has been appointed general sales manager of the Schavoir Rubber Co., Stamford, his duties beginning June 26.

Mr. Schwartz leaves the Automobile Tire Co. of New York and was formerly connected with the Continental Caoutchouc Co., New York City.

The Schavoir company has recently trebled its capacity, and plans are now under way for a still greater extension. Mr. Schwartz for the present will be located at the Stamford plant, pending the opening of a New York office.

New Overland Four at \$635

Model 75 B Is Continuation of Model 75—Has 1¼-Inch Larger Bore

TOLEDO, OHIO, June 24—Announcement has just been made of a new series of the smaller four-cylinder Overland that was originally brought out last November as model 75. The new car is known as model 75 B, and is very little different from the previous series, except in the increase of the bore from 3½-in. to 3¾-in., with the stroke remaining at 5 in. There are other engineering refinements of a minor character that add to the efficiency, however. The price of the new 75 B touring car of five-passenger capacity is \$635, and the roadster costs \$620. The previous series touring model was \$615 and the roadster \$595, and while the greater materials cost would be sufficient reason for a price increase of this amount, the increase of the engine power, together with the other refinements that have been made render the car well worth the additional figure.

There have been no alterations in design to speak of in the power plant, except those changes that have added to the power. The motor now develops 31.5 hp. at 1950 r.p.m. The body looks practically the same, and there are the same little conveniences such as the electrical control box on the steering column, one-man top, demountable rims, and all the fittings of the day.

This model Overland is built on a wheelbase of 104 in.; has cantilever rear springs; retains the characteristic Overland construction of incorporating the gearset with the rear axle, possesses the tapered frame; is fitted with Auto-Lite starting and lighting and has 31 by 4 tires.

Flint Is Wilson Sales Manager

DETROIT, MICH., June 26—Herbert J. Flint, well known in the industry, has joined the forces of the J. C. Wilson Co., this city, as general sales manager. He will have full charge of the distribution of the Wilson truck. Flint was eastern sales manager for the Smith Form-a-Truck, and prior to this was with Thomas J. Hay, distributor of Hupmobile and Chandler cars in Chicago.

Smith, Premier Trustee, Moves Office

INDIANAPOLIS, IND., June 24—Frank E. Smith, trustee of the American Motors Co., and the Premier Motor Mfg. Co., has moved his office to the second floor of the Russel M. Seeds Building, this city.

70% Duty on French Imports

Replaces General Prohibition of American and English Automobile Chassis

PARIS, June 27—*Special Cable*—The French Government has replaced the general prohibition from the United States and England of automobile chassis, with or without motor or body, automobile coach work and other automobile parts, with a 70 per cent duty.

The former decree, issued on May 15 last, authorized the Ministers of Commerce and Agriculture to make exceptions and permit, under conditions to be determined by the Minister of Finance, the importation of particular articles.

No official explanation of the new decree has been made, but is thought that the ruling undoubtedly has been put into effect with a view to procuring more space in vessels coming to French ports for supplies the government needs.

England to Curb Motorists

LONDON, June 21—The Government has decided that more effective diminution in the use of automobiles can be obtained by control than by increasing taxes on cars.

According to an announcement made in the House of Commons to-day, the increased taxes are to be rescinded and a central authority created with power to grant permits for the purchase of specified amounts of gasoline, on which a license of 6 pence per gal. must be paid at the time of purchase. For commercial vehicles or those of doctors and veterinary surgeons the permits will be issued at half rates.

National Twelve Price \$160 Higher July 1

INDIANAPOLIS, IND., June 24—Due to the high cost of materials and labor, the National Motor Vehicle Co. will raise the price of its twelve-cylinder model \$160 on July 1. The car now sells at \$1,990 and the new price will be \$2,150.

1917 Marmon Unchanged

INDIANAPOLIS, IND., June 26—No changes of any consequence will be made in the Marmon 34 for 1917. The present model will be continued throughout next year with possibly a few minor refinements in detail.

Brown Carriage Co. Enters Automobile and Truck Fields

CINCINNATI, OHIO, June 24—The Brown Carriage Co., this city, which has heretofore concentrated its manufacturing activities in horse-drawn vehicles,

will expand and enter the automobile field with a five-passenger car selling at \$735, two light delivery cars at \$675 and one at \$670.

The models will be assembled at its plant and will include parts of well-known manufacturers. A four-cylinder 3½ by 4½-in. LeRoi motor will be used. Other features include: constant level lubrication with positive oil pump delivering oil at both ends of motor; thermo-syphon cooling; Atwater Kent ignition; U. S. L. storage battery; Allis-Chalmers electric starter; electric lighting from storage battery; Kingston carbureter; multiple-disk clutch; left drive; 105-in. wheelbase; Walker & Weiss rear axle; Hyatt roller bearings; and one-man mohair top.

Allen Continues Model 37

FOSTORIA OHIO, June 22—The Allen Motor Co., Fostoria, has announced that its present Model 37 touring car and roadster will be continued, with no change. The price of \$795 is given in the announcement of the continuation of this model, but while it states that the car will not be changed, it does not guarantee that there will be no raise in price.

Large Four for Argo

JACKSON, MICH., June 24—A larger four-cylinder model is to be marketed by the Argo Motor Co., this city, as a running mate to the present small four-cylinder car. No details of the new model are as yet forthcoming, but they are expected within the next 30 days.

Empire Continues Present Models

INDIANAPOLIS, IND., June 24—The Empire Automobile Co., this city, will make no change whatever in its present models before about the time of the New York automobile show next January.

Ford Blast Furnaces in Detroit to Cost \$8,000,000

DETROIT, MICH., June 26—The Ford Motor Co. has made arrangements for the erection, in West Detroit, of blast furnaces and a plant for making parts. This is distinct and apart from the tractor plant and will be built before the tractor plant so as to make the company independent of other concerns in obtaining parts used in the Ford machine.

It is the plan of the company to have the ore brought direct to the new plant and run through to the completed parts with one heating. At least two blast furnaces will be built and possibly four, and the initial cost of the plant will be \$8,000,000. With work beginning on the blast furnaces and parts plant this fall, work on the tractor plant will be put aside until next spring.

Mitchell Motors Co. Formed

To Acquire Business of Mitchell-Lewis Concern—Will Finance Expansion

NEW YORK CITY, June 26—The Mitchell Motors Co. will acquire the business of the Mitchell-Lewis Motor Car Co., Racine, Wis., as a result of the forming of a syndicate to underwrite the capital stock of the new company. The syndicate will be composed of Ladenburg, Thalmann & Co. and A. G. Becker & Co., Chicago, and the issue will be 125,000 shares of common stock without par value. The present capital is \$10,000,000.

This new financing will enable the company to greatly enlarge its production of cars. It is stated that the company may expend \$100,000 in factory improvements so as to bring the production up to 30,000 cars a year.

No change will be made in the directorate, H. L. McClaren remaining president; W. H. Armstrong, secretary; F. L. Mitchell, treasurer, and J. W. Bate, first vice-president and chief engineer.

Elgin Corp. Merges New Era

CHICAGO, ILL., June 26—The Elgin Motor Car Corp., this city, has absorbed the New Era Motor Car Co., Joliet, Ill., thus acquiring the New Era light four and the light delivery wagon. The Elgin corporation is now assured of an ample supply of materials as the New Era concern had made excellent arrangements in this respect with some of the largest material producers in the country. The plant facilities of the New Era company will enable the Elgin firm to greatly increase its production.

The Elgin corporation reports that its entire season's output is oversold.

Saginaw Co. Starts Work

SAGINAW, MICH., June 24—The Saginaw Motor Car Co., which was organized and financed by persons in this city, and which is manufacturing the Yale eight for an exclusive selling agent, is now in its plant and expects to make first deliveries about Aug. 1. The officers, all of Saginaw, are J. A. Cimmerer, president; J. W. Grant, vice-president; W. C. Wiechmann, secretary; H. E. Oppenheimer, treasurer; L. J. Lampke, general manager.

Schebler Co. Changes Name

INDIANAPOLIS, IND., June 26—The firm name of Wheeler & Schebler, carbureter manufacturers, will be changed July 1 to the Wheeler-Schebler Carbureter Co., Inc. There will be no change in the policy or personnel of the organization.

Maxwell Lowers Prices July 1

Touring Model \$595—Roadster \$580—100,000-Car Output Planned

DETROIT, MICH., June 27—Effective July 1, the Maxwell Motor Co. will market its touring car at \$595, a reduction of \$60, and will sell the roadster at \$580, a drop of \$55. The reduction is ascribed to a greatly increased production that offsets any increases in the cost of materials. The schedule now calls for an output of 100,000 cars for the coming selling year.

The 1917 Maxwell is not changed over the present car. The Maxwell management now believes the car to be standardized, and will not alter the product in any way from the regular chassis of 102 in. wheelbase and powered with a 3% by 4½-in. four-cylinder block motor carrying the same five body types, namely, touring, roadster, cabriolet, town car and sedan.

Plants of the Maxwell company at Newcastle, Ind., Dayton, Ohio, and this city are now working to capacity, and the present production is being stepped up to meet the new schedules.

Detroit Seamless Tubes Co. Buys New Plant Site

DETROIT, MICH., June 24—The Detroit Seamless Steel Tubes Co., maker of a wide variety of tubing for motor vehicles, has purchased a 12-acre site in the western part of the city for the purpose of erecting a new factory that will allow four times the present output. It is estimated that the plant, which will be entirely under one roof, will have a length of 700 ft. and a width of about 400 ft., enabling an output of 5000 tons monthly with a payroll of 1000 men. In this business the furnaces must be kept going continuously, making it necessary to work 24 hr. a day.

The Detroit Seamless Tubes concern is now turning out about 300 tons of tubing monthly with a force between 300 and 400 men, about 80 per cent of the product going to the automobile industry and the balance used in locomotive boiler construction. Rear axle tubes, and a great variety of sizes and shapes of tubing for the needs of the modern car have revolutionized the tube business. This company started in 1900 with a 100-ton monthly capacity and 100 men, an indication of the rapid strides that have been made.

Lakeside Foundry Buys Site

MUSKEGON, MICH., June 24—With the intention of tripling its present output, the Lakeside Foundry Co., producer of

automobile castings, has purchased a factory site on Western Avenue, between Seventh and Eighth Streets, having a frontage of 270 ft. and extending back a block. It is the intention to build a structure measuring 75 by 225 ft. with a molding floor 60 by 150 ft. The present buildings are 60 by 90 ft. and the working force fifty-five men, which will be considerably enlarged when the new quarters are occupied.

Young Heads Flint Cushion Spring Co.

DETROIT, MICH., June 24—The L. A. Young Corp., a holding company which owns the Detroit Wire Spring Co., and several other large automobile parts plants here, has purchased a 7-acre tract of land at Flint, Mich., on which will be erected a very large plant for the Flint Cushion Spring Co. L. A. Young of this city is president and C. O. Ormsbee, for 17 years with the Durant-Dort Carriage Co. and 11 years in the trimming end of the Buick organization, has been made factory manager.

To Erect Seven Units

Eventually some seven units will be erected on the Flint site, according to Mr. Young, the first of these being under construction at the present time. All will be of the saw-tooth, one-story type, since there is plenty of room to spread out. The first unit is to measure 620 by 100 ft., but if present plans are carried out it will eventually extend for 800 ft. As the plot of land is diagonal in shape, the other units, between each two of which there will be a side track, will taper off from this maximum length to about 450 ft. for the shortest wing. The first unit will employ 240 men. This move will not affect the Detroit plants, but inasmuch as the concern is doing about 60 per cent of the seat spring business of the Flint factories, it was deemed advisable to get closer to them. Besides cushion springs, other small parts for cars will be made at Flint.

The Detroit spring factory, now making 500,000 sets of springs annually, is being enlarged also by a building 400 by 100 ft.

Celfor Plant Nears Completion

BUCHANAN, MICH., June 24—The new factory building of the Celfor Tool Co., maker of automobile parts and internal gear drive axles, is now nearing completion. It is a structure measuring 137 by 300 ft. and is constructed along modern factory lines of brick and steel, one story in height. This will be ready for occupancy in 4 weeks and will permit of a large increase to the Celfor production.

Wagner and Hoyt Combine

Together with Gerald Laugh Form Company to Manufacture Electrical Equipment

NEW YORK CITY, June 26—A. F. Wagner, president of the Wagner Specialties Co., New York, and Frank Hoyt, formerly chief engineer of the Simms Magneto Co., together with Gerald Laugh, formerly connected with the National Cash Register and Burroughs Adding Machine companies, have formed the Wagner-Hoyt Electric Co. and will manufacture complete electrical equipment for automobiles and market it as a unit. Wagner will be president and general manager of the company, Hoyt treasurer and chief engineer and Laugh secretary. For the present, the salesrooms of the Wagner Specialties Co. in New York City will be maintained and an office has been opened in the Woolworth building. A factory somewhere in New Jersey will be occupied though the exact location has not been decided.

The concern has obtained a license under the patents of the late H. Ward Leonard covering the control of electric lighting systems on motor cars and in addition to producing the complete electrical equipment of a car including starting and lighting, ignition and lamps, will also market a new type of storage battery. The concern will market its product as a complete unit for the entire electrical equipment of a motor car.

New Stover Tractor Engine

FREEPORT, ILL., June 24—A new engine has been added to the list of the Stover Tractor Mfg. & Engine Co. It is known as a four-cycle, semi-Diesel crude oil machine, and is an entirely new departure. William F. Freidag, superintendent, is the designer. This type of engine has been manufactured in Europe for several years, but American manufacturers have been chary of it.

Gordon Co. to Start Tire Manufacture Soon

COLUMBUS, OHIO, June 22—Manufacture of automobile tires will be undertaken by the J. P. Gordon Co., Fourth and Naghten Streets, just as soon as machinery can be installed. Owing to the rush in the factories where the machinery is made, Mr. Gordon said that he did not think it would be possible to start this new department before 4 months. A tire expert has been employed and the preparation of the room and the installation of the machinery will be under his direction.

This company was started 16 years ago by Mr. Gordon and he has seen it

grow from one man with a machine to a plant employing 500 people. The company formerly was known as the Vehicle Hood and Apron Co. It makes tire covers and a variety of accessories, including a one-man top. Two new buildings in the factory group have just been completed.

The company has disposed of its raincoat and clothing business to the Cleveland Raincoat Co. and all of the finished stock on hand has been shipped to Cleveland.

General Tire & Rubber Co. to Expand Plant

AKRON, OHIO, June 22—Less than 6 months old and already erecting an addition to its present plant is the record of the General Tire & Rubber Co., Akron's newest rubber factory.

This company was formerly located at Kansas City, Mo. Tire accessories and a few rubber specialties were the principal products, the company being in this line for about 7 years. Increased business in this department, together with a growing tire business makes the additional space necessary. Within 10 days the plant will be manufacturing about 150 tires per day.

M. O'Neil, president of the company, states that with the contemplated increased equipment and floorspace, the capacity of the factory will be 500 tires per day.

Detroit S. A. E. to Repeat Noronic Melodrama July 7

DETROIT, MICH., June 26—So much pressure has been brought to bear on the Detroit Section of the Society of Automobile Engineers that it has been decided to again produce the five-act melodrama that was given by the Section on the Noronic during this year's 4-day boat trip of the Society. The little play bears the imposing title of the "Trials of Gwendolyn, or Snatching Victory from the Jaws of Defeat." Arrangement have been made to give the play in the Lyceum Theater on July 7.

It took much rehearsing to put the piece on on the boat, it being a five-act play, and having the following members of the local section in its cast: B. G. Koether, C. M. White, R. T. Middleton, J. W. Stark, R. S. Lane, W. D. Rockwell, J. Dow, W. H. Conant, P. L. Barter, C. I. Stevens, F. R. Bay, L. J. Schneider, K. W. Zimmerschied, G. W. Dunham, Russell Huff, and J. C. Weed. The section invites all out-of-town members of the Society who wish to see the next president of the Society, the present president and the other prominent members go through their capers again.

The play was written by Frank Briscoe, and produced under the direction of N. A. Pabst.

Three Big Parts Cos. in Merger

Steel Products Co. To Consolidate with Mich. and Metals Welding Cos.

DETROIT, MICH., June 26—In order to effect the usual economies of large scale production and with a view to considerably broadening the service offered the car builder, interests headed by C. E. Thompson, president of the Steel Products Co., Cleveland, Ohio, have obtained control of several large plants specializing in manufacturing and engineering work for the motor vehicle makers. With a capital of \$4,000,000, the interests that are to be consolidated under the name of the Steel Products Co., with headquarters at Cleveland, are the present Steel Products Co., Cleveland; the Michigan Electric Welding Co., Detroit, and the Metals Welding Co., Cleveland.

The officers of the new Steel Products Co. are C. E. Thompson, president; W. D. Bartlett, vice-president, and J. A. Krider, secretary and treasurer. The plants will continue to operate under their own names as subsidiary plants of the Steel Products Co., and the consolidation will undoubtedly be developed along the same lines as the Steel Products Co. E. C. Reader, manager of the Metals Welding Co., and C. F. Clark, manager of the Michigan Electric Welding Co. will both continue in their present capacities.

The Steel Products Co. makes valves, spring bolts, and other hardened and ground parts; the Michigan Electric Welding Co. produces drag-links, brakes, torsion radius rods and other rod assemblies, head lamp brackets and round stock spring clips; and the Metals Welding Co. makes acetylene welding equipment, high-speed cutting tools, and does a large business in motor vehicle welding work. Each firm is a leader in its particular line, having for some years furnished parts for nearly all the leading car makers. The equipment owned by the new combine covers some of the most important processes in automobile manufacture, such as metallurgical work, heat treating, precision grinding, polishing, electric welding, acetylene welding, and automatic machine and general steel manufacturing equipment. Extensive additions to all the plants affected are now under way.

Three New Menominee Trucks

MENOMINEE, MICH., June 24—The Menominee Motor Truck Co., this city, announces three new models, one of which is a continuation of the previous ¾-ton truck with a worm-drive axle in-

stead of the helical gear drive, another an entirely new worm drive 1½-tonner known as the model H, and a 3½-tonner of new design, selling at \$2,775. The price of the new ¾-tonner is \$1,295, an increase of \$170 over the selling price of the previous model of the same capacity. The chassis price of the 1½-tonner is \$1,775. Other models sell at \$2,240 for the 2-tonner and a 1-tonner at \$1,575.

The new model H, 3000-lb. capacity, embodies several unusual features such as shock-absorbing radiator support, auxiliary springs to prevent overtaxing of the main springs, automatic governor regulating the speed of the trucks, and brake eveners of the universal type designed to eliminate the possibility of rods or yokes binding.

The motor is Continental, three-point suspension unit power plant with 3¼-in. bore and 5½-in. stroke. Other features include Stromberg carbureter, Bosch magneto and combination and forced-feed system of lubrication.

The new ¾-ton model EW has a 3¼ by 5-in. motor. The clutches are Brown-Lipe multiple-disk in both models, with gearsets of the same make, three speeds forward and reverse. The smaller model has a 6 to 1 ratio on high and the large truck 9¼ to 1. Timken worm-drive, floating axles with nickel steel shafts characterize both.

Detroit Battery Co. Moves Into Its New Plant

DETROIT, MICH., June 24—The Detroit Battery Co., maker of automobile storage batteries, is now moving into its new factory, which is a three-story plant of modern fireproof construction, each floor measuring 100 by 90 ft., the total floor space amounting to 25,000 sq. ft. It is stated that the new quarters will enable a production of 500 batteries a day, a big jump from the production in the old plant of fifty to seventy-five batteries daily.

The Detroit Battery Co. is now several years old, has a capital of \$60,000 and makes its product in sizes to fit any make of car, numbering among its standard equipment customers Briscoe, Argo and other car builders. The officers are S. W. Elston, president; Wm. Petzold, vice-president; Sol Meyer, treasurer; M. G. Pierson, secretary, and Wm. Ducharme, director.

Pratt Enters Truck Field

BUFFALO, N. Y., June 26—The Higrade Motors Co. has been formed here with a capital of \$250,000 and will embark in the manufacture of a medium-sized truck. J. Elmer Pratt heads the organization and associated with him are Will J. Loomis and L. W. Coppock. The truck is described as being between the big vehicle and the little one and will have

a wheelbase of 115 in., and be mounted on 4-in. pneumatic tires. It will have a four-cylinder $3\frac{1}{4}$ by 5 motor, equipped with Bosch ignition and an electric lighting and starting system. Other specifications include Sheldon springs and worm axle, Spicer drive, Fedder cellular radiator, Detroit Gear transmission, Borg & Beck disk clutch, Lavine semi-irreversible steering gear. The chassis will weigh about 2200 lb. and the price will be less than \$1 per lb. It is stated that \$170,000 of the capital already has been taken up.

\$300,000 for Armored Trucks

WASHINGTON, D. C., June 26—The House to-day passed the army appropriation bill, the measure carrying approximately \$182,000,000; \$300,000 of which is allowed for armored trucks as a result of the Mexican situation. This bill will now go to the Senate where action on it will be expedited.

Depleted Horse Market Stimulates Truck Buying by Army

NEW YORK CITY, June 26—A lack of horses and mules in this country will have a stimulating effect on commercial vehicles sales to the United States Army at the present time. This country has exported since the war began 590,452 horses and 154,077 mules and the U. S. Government finds the market depleted as a result.

The equipping of the forces for the Mexican crisis will be a sharp stimulus to the buying of trucks and passenger cars on account of the scarcity of horses and mules. The United States has been steadily building up truck trains since General Pershing started his advance into Mexico, but it is stated that the truck equipment at present is below requirements.

200 Troy Trailers Ordered

TROY, OHIO, June 22—The announcement is made that the Troy Wagon Works has an order for 200 trailers, equipped with brakes, rubber tires and special bodies from the French Government for war purposes. The order calls for \$413,000.

Austrian Firms to Make Trucks

VIENNA, AUSTRIA, June 26—Several Austrian companies will start the manufacture of motor trucks when the war is over. Among those reported that will undertake this business are the Skoda-werke A. G., of Pilsen, and the Waffen-fabrik at Steyr. These companies have large funds available, highly trained technical staffs, mechanics and business administrations. They will start on a large scale.

Government Opens Truck Bids

Proposal on $1\frac{1}{2}$ to 3-Tonners in Numbers of from One to 1000 of Each

WASHINGTON, D. C., June 23—A proposal has been sent out to manufacturers by the U. S. Government asking for bids on trucks from $1\frac{1}{2}$ to 3 tons, in numbers of from one to 1000 of each. Bids are to be opened for these trucks at the New York post on June 30. This order means that the government is preparing now to supply its troops with adequate motor transportation equipment in case it is necessary to raise a large volunteer army for service in Mexico.

Meantime individual shipments of truck fleets continue to be made. One of the most recent of these included twenty-eight 3-ton Peerless transport trucks and five tank trucks on the same chassis. These vehicles were all equipped with bodies and the Peerless company furnished drivers for them. They were shipped on gondola cars on June 19, being routed over a passenger schedule to reach Brownsville, Tex., June 22. One gondola car was used for two trucks, so that the complete train comprised fourteen of these and one Pullman tourist car for the crew. Previous to this ten 600-gal. tank trucks were shipped by the same company.

Repair Trucks Provided

This order is of especial interest in view of the capacity of the trucks. Besides these, thirty 3-ton Rikers and fifty 3-ton F. W. D., four-wheel-driven trucks are being used by our punitive expedition. Fifteen of the F. W. D. trucks are equipped with 600-gal. tanks, used to haul water for the men and cavalry horses.

The deficiency of repair trucks is rapidly being relieved. The Four Wheel Drive Auto Co. of Clintonville, Wis., has delivered most of an order of eight of these vehicles, mounted on 3-ton chassis, each carrying a 13-in. lathe with a 5-ft. bed, a drill-press, a grinder, a portable drill, a cabinet bench, three vises, a forge, three anvils, an oxy-acetylene welding and cutting outfit and a complete set of blacksmithing, machine and carpenters' tools.

Power is derived from a 9-hp. four-cylinder auxiliary engine, driving a dynamo, each machine having direct electric drive. The dynamo also supplies current for electric lights.

Quick-Firers on Quads

Another new wrinkle in truck equipment is that of quick-firing guns which have been mounted on the steel dashes

of a number of the Jeffery Quad transport trucks, so that transport trains can be self-defending in case of an attack.

Road conditions, as is well known, are atrocious. Nevertheless, some amazing records have been made by different trains in the service. Packard train No. 3 recently clipped an hour from the record between Casas Grandes, Mexico, and Columbus, N. M., making the 104 miles in 10 hr. actual running time. On this trip it had been away from its base for 14 days, having traveled about 1000 miles in that time.

Improving the Roads

To improve these roads four Phoenix Centiped creeper-driven good roads trucks, four Acme road scrapers and eighteen steel dump wagons have been shipped from Chicago to Columbus for use in improving the road between Columbus, N. M., and Namiquipa, Mexico, so that in the event of more activity in the southern republic, the use of motor trucks will be facilitated.

Recruiting Drivers

Drivers used in Mexico have been recruited from among the workers in truck factories. Some are New York taxicab drivers, others are college men in search of travel and adventure, others miscellaneous chauffeurs out of work who have answered advertisements, many are enlisted men who have been trained to drive their mounts since the crossing of the border by our troops. Some of them are negroes and all reports agree that their behavior has been excellent. Some of the drivers have performed their duties with great credit and others have been very unruly. In practically all cases, there has been a lack either of military discipline, or, in the case of enlisted novices, of mechanical ability. On several occasions civilian drivers have refused to obey the orders of the army officers commanding them. They have even abandoned their mounts. Some of the officers have taken matters in their own hands and compelled the drivers to do their duty. In other cases the men have been arrested and held under guard until they had agreed to return to work.

Trucks in Mexico

Up to May 1, the trucks in Mexico were as follows:

28 Trucks Each		
Company 1,	Q.M.C.	Jeffery
Company 2,	Q.M.C.	White
Company 3,	Q.M.C.	Packard
Company 4,	Q.M.C.	Jeffery
Company 5,	Q.M.C.	Jeffery
Company 6,	Q.M.C.	Jeffery
Company 7,	Q.M.C.	Jeffery
Company 8,	Q.M.C.	White
Company 9,	Q.M.C.	White
Company 10,	Q.M.C.	Packard
Company 11,	Q.M.C.	Packard
Company 12,	Q.M.C.	Packard
Company 13,	Q.M.C.	Riker
Company 14,	Q.M.C.	F.W.D.

Miscellaneous trucks for work about

posts and camps on border, as follows:

Signal and Aero Corps.
Fourteen F.W.D.'s.
Seven White tank trucks.
Six Velies.
Two Packard repair trucks.
Two Peerless 4-tonners.
Two Rikers, 3-ton.
Two White radio-telegraph trucks.
Two White 1½-tonners.
One Federal 3½-tonner.
One Kelly-Springfield.
One Lippard-Stewart.
One Mais.
One Peerless.
One Republic.
One White 3-ton.
One White, Signal and Aero Corps.
Jeffery Quads.

Cortland Car & Carriage Co. Busy

SIDNEY, N. Y., June 24—The Cortland Car & Carriage Co., this city, manufacturer of the Hatfield roadster and suburban cars and for nearly 30 years builders of finished carriages, has entered the automobile field. The company will produce a moderate-priced car.

It is now devoting all its factory space to automobile manufacturing and to take care of this production is increasing its capital from \$75,000 to \$225,000 by issuing 7 per cent accumulative preferred stock, also common stock, both of which are sold at par. The preferred stock will be sold separately but subscribers to the common are required to take an equal amount of the preferred.

Canadian Registrations Gain

WINNIPEG, MAN., June 24—Out of 8616 licensed automobiles in Manitoba, for the year 1915, 3425 were Fords, 1004 were McLaughlin-Buicks and 622 Overlands. In Saskatchewan, where there is about the same number of licensed cars as in Manitoba, there are 3514 Fords, 742 McLaughlins and 304 Overlands. In Alberta, 5586 cars bear license plates. Of this number there are 2695 Fords, 583 McLaughlins and 312 Overlands. Also Chevrolet, Dort, Hudson, Scripps-Booth and others are establishing sales records every day.

According to statistics recently compiled, Toronto leads all other cities in Canada in number of automobiles registered. Toronto at the end of 1915 had 8915, a gain of over 1400 over the preceding year. Montreal comes next with 3917, an increase of less than 100 over 1914. On the whole the Western cities of Canada show themselves to be the heaviest purchasers. Vancouver registered 3719, as against 2578 in 1914.

C. A. A. Wins Interclub Run

CHICAGO, ILL., June 23—The Chicago Athletic Assn. won the Interclub Reliability Contest from the Chicago Automobile Club in the 2-day run to Indianapolis and return, the score standing 277 points penalty for the C. A. A. and 605 points penalty for the C. A. C.

Militiamen Backed by Industry

Car, Truck, Parts and Accessory Concerns to Continue Pay and Positions

NEW YORK CITY, June 27—That the automobile industry is doing its share in helping to swell the list of enrollments in the army for work on the Mexican border is manifested by the number of companies agreeing to compensate their workers who join the army.

The large tire factories in Akron are in the van in their announcement of compensation and open position for all employees who are enrolled in the State militia or who enlist for service on the border in Mexico. The Goodrich company is to give soldier employees, who are married or single and supporting dependents, two-thirds of their average pay, based on their earnings during the past 3 months, after making deductions of the amounts received from the government. Single men and married men not contributing to the support of dependents will receive one-half of their salaries. Payment will be made to their dependents held in trust until the return of the employee. Absence for military duty will not affect the pension and insurance funds, but employees will be continued on the rolls. The men will be considered on leave of absence and their places will be held open. These conditions apply for 1 year.

Various Companies' Arrangements

The Firestone plan is to give all employees, who have been with the company for 3 years, who have enlisted prior to June 20, full pay, less the government allowance. Employees of 1 to 3 years, two-thirds pay, less the government allowance. The arrangements will hold good for 1 year and will also apply to all employees who enlist hereafter, down to 6 months' service with the company.

The Goodyear company makes a similar announcement, agreeing to give all its employees a large part of their pay, less the government allowance.

The Studebaker Corp. will place all men who go to the Mexican border on full pay for the balance of the year. This applies to men employed at both the Detroit and South Bend plants, who have enlisted to go to the front. At the present time the payroll numbers about 7000 men, and some forty-five to fifty have already gone to the training camps. The Equitable Life Assurance Society has agreed to continue in force the life insurance policy which each of the employees hold under the Studebaker insurance plan.

The U. S. Rubber Co. gives full pay

to all called on active service and their positions will be held open for them pending their return.

Packard employees will receive their full pay for the 2 weeks' period immediately following the mobilization order.

The Vacuum Oil Co., New York City, will grant all employees leave of absence and full pay continued until further notice. In addition the firm announced that employees desiring to join the military training camp at Plattsburg would receive 2 weeks with full pay in addition to the regular 2 weeks' vacation.

The Paige-Detroit Co. of New York, through E. M. Dalley, the president, announces that families of its employees who have answered the call to colors will be cared for.

The Pyrene company will give full pay to those employees enlisting.

Ford to Keep Jobs Open

Henry Ford has denied the rumor that he would discharge any of his employees who enlisted in the National Guard. Those men who enlist can return to employment without prejudice, states Mr. Ford.

The following list shows those companies which are taking care of their employees during their enlistment in the army:

Auto Supply Mfg. Co., N. Y. C.
Firestone Tire & Rubber Co., Akron, Ohio.
B. F. Goodrich Co., Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
General Electric Co., Schenectady, N. Y.
H. W. Johns-Manville Co., N. Y. C.
Paige-Detroit Co. of N. Y., N. Y. C.
Packard Motor Car Co., Detroit, Mich.
Pyrene Mfg. Co., New York City.
Studebaker Corp., Detroit, Mich.
R. E. Taylor Corp., N. Y. C.
U. S. Rubber Co., N. Y. C.
Vacuum Oil Co., N. Y. C.

\$60,000 Plant for Dort

FLINT, MICH., June 24—To take care of increased business, the Dort Motor Car Co., which has been building motor cars for about 1 year now, and which is the outgrowth of the motor vehicle building operations of the Durant-Dort interests, has purchased several large pieces of land here, on which a \$60,000 plant is to be begun immediately. All the buildings formerly utilized by the Durant-Dort Carriage Co. have also been taken over for the manufacture of cars. Besides, several lots adjacent to present factory buildings have been acquired for expansion of these plants.

198,150 Ohio Registrations

COLUMBUS, OHIO, June 22—According to Registrar of Automobiles W. H. Walker, up to June 21, 194,000 licenses have been issued to owners of gasoline cars and trucks. The number of electrics is 4150. Manufacturers and dealers to the number of 2750 have been registered in that period. It is estimated that more than 230,000 cars will be registered by the department if the present rate is maintained.

[illegible]

statement made by the inventor recently.

Enricht stated that the Maxim company is building two laboratories in Farmingdale, L. I. He also stated that there was nothing in the theory that he decomposed water and used the hydrogen from it for his motive power. The water is only the carrier which takes the explosives through the motor. It has nothing to do with the fuel properties.

A chain of laboratories all over the country is planned to market the chemical, and of this chain the two buildings now being put up in Farmingdale, are numbers 4 and 5.

13th Year for Ford

DETROIT, MICH., June 24—This is birthday week for the Ford Motor Co., which is now 13 years old. Organized June, 1903, the Detroit factory employed 311 men, and completed a fiscal year's production with 1708 cars to its credit. June this year finds the Detroit organization employing 31,000 men and turning out 500,000 cars. There are twenty-eight branch factories in the United States, besides the Ford Motor Co. of Ford, Ont., which employs 2500 men, and the Ford Motor Co., Manchester, England, with 2000 on its payroll.

Ford has fifty-one branches in this country and 9000 agents; nine branches and 100 dealers in Canada; a branch in London, England; one in Paris; another in Bordeaux, France; one at Buenos Aires, and one at Melbourne, Australia.

Dividends Declared

Standard Screw Co.; semi-annual of 3 per cent on common and an extra of 3 per cent. Regular semi-annual dividends of 3 per cent on the Class A preferred and 3½ per cent on Class B have also been declared. All dividends payable July 1 to stock of record June 23.

Decline in Security Prices

Suffer Setback on Weak Market—Few Gains Made—Losses Are Many

NEW YORK CITY, June 27—Automobile security prices declined last week as a result of the unsettled conditions in this country in regard to the Mexican situation. The market yesterday sold steadily downward on account of the growing imminence of war with Mexico and the general feeling that the United States is as yet unprepared. Publication of the fact that the Government is in the field for 4000 trucks, while it would ordinarily be a bullish argument, because of the increase business to be derived by the automobile trade, did not have a bullish effect this time.

United Motors dropped 11½ points. Announcement in regard to this stock has been made that the Guaranty Trust Co. has deposited 67,274 shares of Perlman rim stock, which 6 months from May 25 will be exchanged on the basis of one share for two shares of United Motors. The remaining 32,724 shares of Perlman retain their original status, but may not be exchanged, as the time limit has expired and not been extended.

Overland Makes Gain

Willys-Overland common was one of the few stocks to record a gain, amounting to 2 points. In regard to the recent merger failure, in which J. N. Willys figured prominently, it has come to light that the real cause of the failure of the merger was the refusal of Mr. Willys to proceed with the merger because the manager feared to let him have a free

market for his stock in the new company. Mr. Willys asked for 2,500,000 shares or more cash than could be raised, in return for selling out. His holdings in stock would have been in the neighborhood of four sevenths of the total stock, and the other members of the financing committee were quite willing to give this in exchange for the Willys-Overland, provided he would agree to withhold it from the market for a stated time. This he refused to do, and the merger was called off.

The Saxon Motor Car Corp. last week made application for listing its stock on the Stock Exchange. The Packard company is offering through William A. Read & Co. at 104 and accrued dividend a block of the 7 per cent cumulative preferred stock, of which the total amount authorized and outstanding is \$8,000,000.

Edmunds & Jones Common Pays 4%

DETROIT, MICH., June 25—The common stock of the Edmunds & Jones Corp., which in March took over the Edmunds & Jones Mfg. Co., Detroit, the Canadian Lamp & Stamping Co., Ford City, Canada, and the Chicago Electric Mfg. Co., Chicago, was to-day placed upon a dividend basis of \$4 per share. The combination ranks as the largest maker of electric, acetylene and oil lamps for automobiles and trucks.

Now Monarch Governor Co.

DETROIT, MICH., June 24—The name of the Kramer Governor Co., maker of a speed-controlling device for trucks, has been changed to the Monarch Governor Co. The concern's plant remains at Twelfth and Bethune Streets, at which the output is now about 150 instruments a day.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915		1916		Wk's Ch'ge
	Bid	Asked	Bid	Asked	
Ajax Rubber Co. (new).....	92	93½	160	175	—2
Chalmers Motor Co. com.....	92	93½	160	175	—2
Chalmers Motor Co. pfd.....	95	97	99	103	—1
Chandler Motor Car Co.....	..	..	108	109	+ ¼
Chevrolet Motor Co.....	..	..	214	216	—8
Electric Storage Battery Co.....	..	..	61¼	62½	—1¼
Firestone Tire & Rubber Co. com.....	503	510	880	114	..
Firestone Tire & Rubber Co. pfd.....	111	..	112	541	..
General Motors Co. com.....	152	154	470	114	—6
General Motors Co. pfd.....	101	102½	112½	73¼	—1
B. F. Goodrich Co. com.....	51½	53½	73	73¼	—1½
B. F. Goodrich Co. pfd.....	101	102	113½	114	—1½
Goodyear Tire & Rubber Co. com.....	268	274	230	234	—3
Goodyear Tire & Rubber Co. pfd.....	105	106¼	106½	107¼	..
International Motor Co. com.....	13	14	12	..	..
International Motor Co. pfd.....	35	37	18	23	—2
Kelly-Springfield Tire Co. com.....	159	162	69	71	—3
Kelly-Springfield Tire Co. 1st pfd.....	86	87	95	96¼	+ ½
Maxwell Motor Co. com.....	39	41	80½	80½	—2½
Maxwell Motor Co. 1st pfd.....	84	86	85	85½	—2½
Maxwell Motor Co. 2d pfd.....	34	35	54	55	—3¼
Packard Motor Co. com.....	104	..	190	200	..
Packard Motor Co. pfd.....	96¼	100	100	104	..
Paige-Detroit Motor Car Co.....	..	..	55	56	+2
Peerless Motor & Truck Corp.....	..	..	24	26	+ ½
Perlman Rim Corp.....	..	..	..	..	..
*Reo Motor Truck Co.....	15½	15¼	37¼	37¼	—¼
*Reo Motor Car Co.....	..	31	40½	41¼	—3
Saxon Motor Car Co.....	..	..	78	84	—2
Stewart-Warner Speed. Corp. com.....	68	68¾	96¼	98	+3½
Stewart-Warner Speed. Corp. pfd.....	105	..	..	..	..
Studebaker Corp. com.....	78	80	137½	138	+1
Studebaker Corp. pfd.....	98½	100	107	111	+ ¼
United Motors Corp.....	..	..	62½	62¾	—10½
U. S. Rubber Co. com.....	51	53	52	53	—1¼
U. S. Rubber Co. 1st pfd.....	106	107	108½	109½	—½
White Motor Co. (new).....	..	..	53	55	—3
Willys-Overland com.....	128	129	277	280	+2
Willys-Overland pfd.....	102½	103½	106¼	106¼	—2¼

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	1915	1916	Wk's
	Bid	Asked	Ch'ge
Auto Body Co.....	..	..	42 46 +6
Chalmers Motor Co. com.....	90	95	170 180 ..
Chalmers Motor Co. pfd.....	93½	97	96 ..
Continental Motor Co. com.....	180	..	37 38 —1
Continental Motor Co. pfd.....	82	86	9½ 10½ —¼
Ford Motor Co. of Canada.....	1000	..	385 ..
General Motors Co. com.....	151½	153	475 545 ..
General Motors Co. pfd.....	101½	103½	112 116 —1
Maxwell Motor Co. com.....	39	42	80½ 83½ —4½
Maxwell Motor Co. 1st pfd.....	84½	87	86 89 —2
Maxwell Motor Co. 2d pfd.....	35	38	55½ 58½ —2½
Packard Motor Car Co. com.....	106	..	193 ..
Packard Motor Car Co. pfd.....	97¼	100	104 ..
Paige-Detroit Motor Car Co.....	..	..	54 ..
*W. K. Prudden Co.....	19½	21	41 44 —1½
*Reo Motor Car Co.....	..	30½	40¼ 41¼ —1
*Reo Motor Truck Co.....	15½	15¼	37 ..
Studebaker Corp. com.....	78	80	136 138½ —2
Studebaker Corp. pfd.....	98	100½	105 105 +4
C. M. Hall Lamp Co.....	..	..	33½ ..

INACTIVE STOCKS

	1915	1916	Wk's
	Bid	Asked	Ch'ge
*Atlas Drop Forge Co.....	26	..	40 ..
Kelsey Wheel Co.....	200	..	350 ..
Regal Motor Car Co. pfd.....	..	25	17 ..

*Par value \$10; all others \$100.

De Palma First at Des Moines

Covers 150 Miles in Mercedes
at 92.66 m.p.h.—Lewis
Wins 50-Mile

WINNERS OF 150-MILE RACE

Car	Driver	Time	Prize
Mercedes	De Palma	1:36:36.23	\$3,000
Maxwell	Henderson	1:38:13.72	1,500
Maxwell	Rickenbacher	1:39:18.72	750
Crawford	Lewis	1:40:00.01	600
Stutz	Cooper	1:40:08.96	500
Hudson	Mulford	1:45:27.15	450
Sunbeam	Galvin	1:46:44.40	400
Stutz	Chandler	Flagged	
		141 Lap	400

DES MOINES, IOWA, June 24—Ralph De Palma won the second annual Des Moines Speedway classic here to-day when he covered 150 miles in 1:36:36.23, or at the rate of 92.66 m.p.h., a speed nearly 6 m.p.h. faster than that of the Des Moines race last year, for a distance of 300 miles in which De Palma was nosed out of first place by Ralph Mulford in a Duesenberg.

Next to De Palma's Mercedes came the two Maxwells which captured second and third places. Rickenbacher, who was the only man to head De Palma during the entire race and who pushed him for the lead during the entire first 140 miles of the race, was robbed of his apparently sure second by a series of tire troubles late in the grind. But his team mate, Pete Henderson, was at his heels and picked up Rickenbacher's place just in the wake of the Mercedes. Henderson, driving a great race throughout, was second in 1:38:13.72, 1 min. and 48 sec. behind De Palma. Rickenbacher, in spite of his troubles, got the checkered flag 1 min., 5 sec. behind Henderson when he finished in 1:39:18.72. Dave Lewis and his Crawford took fourth honors when he finished in 1:40:00.01. Joe Cooper and his Stutz were fifth and Ralph Mulford, Des Moines winner last year with a Duesenberg, could not get better than sixth this year with the Hudson Super-six which he is now driving. Galvin in his Sunbeam was seventh and Chandler, Joe Cooper's teammate, was eighth.

Two Accidents

Two spills, almost coincident and the second directly resultant from the first, failed to mar the race which Starter Wagner declares to have been an ideal contest under ideal conditions. Wilbur D'Alene, one of the Duesenberg team, had his right rear wheel collapse on the last turn of his thirtieth lap. The car leaped into the outer guard rail, rebounded, struck the rail again and then tore downward into the safety apron, where it landed right side up with

neither D'Alene nor his mechanic, Ed Miller, injured, except for a slight cut suffered by the latter. Tom Milton, another of the Duesenberg pilots, was just back of D'Alene and took to the safety apron at high speed to avoid mixing with his troubled comrade ahead. His car spurned the rough earth of the apron and turned over several times. Milton and his mechanic, E. Rathbun, were both under the cowl and both came out unscathed. The accident, however, took all of the Duesenberg contenders from the field, except for Eddie O'Donnell, who was out in the 86th lap when his steering gear went wrong.

De Palma won by master work at the wheel and was more fortunate than usual for him in the matter of tire changes. He was called to the pit but once and that was in the 129th lap when his right front tire gave out. The change was made in 20 sec. Rickenbacher was not so fortunate with his tires. His first trouble sent him to the pits in the 108th lap after he and De Palma had driven almost a neck and neck race up to that time. His second tire change came in the 136th lap and he went in for a new tire for the third and last time in the 142d mile. De Palma gained two laps and a half when Rickenbacher went in for the first change and he held a margin over his rival during the entire remainder of the race even though he himself was forced to the pits once during that time.

De Palma Regains Lead

De Palma led with Rickenbacher pushing him at every turn of the race until "Rick" pushed his Maxwell into the lead in the 87th mile. He held the leadership for a short time only, however, for De Palma soon pushed his Mercedes into the head position again on the lower turn of the 94th mile. During the early stages of the race Galvin and his Sunbeam alternated with Henderson and his Maxwell for the third and fourth places except during the time before D'Alene was put out of the race when he held the fourth place.

Twelve cars went away when Starter Wagner waved the red flag at 1.50 with 20,000 people assembled for the event. De Palma and Rickenbacher at once took the lead and the great race between them was fought out mile after mile with honors almost even but with De Palma always in the lead until the race was half over.

Quick work was the rule at the pits. Dave Lewis and his Crawford got a new tire in 30 sec. Chandler, driving the other Crawford was more seriously delayed by spark plug trouble.

Eddie Rickenbacher turned the tables on De Palma in the 50-mile event which followed the main race. He went the entire distance without a call at the pits

and his time was 31 min. and 9.17 sec. or an average of 96 m.p.h. De Palma was only seconds behind, 9 of them in fact, although he had lost 18 sec. in a tire change. Rickenbacher's margin, however, would have been much larger except for the fact that he had a bad skid in the back stretch. This thrill was missed by the crowd but was observed by De Palma who knew that Rickenbacher lost time by reason thereof, and who thought he had won the race until it was all over. A rechecking of the tape showed that Rickenbacher was the winner. When he had the bad skid in the back stretch he could not keep his car from the rough and he cut a figure eight but managed to right himself and swing back into his wonderful speed, although the delay caused him a drop from the first to the fourth position, a drop which spectators were at loss to understand because they had not seen his trouble.

The 50-mile event was, if possible, even a more exciting and satisfying spectacle than the longer race. Three, instead of two, drivers, were fighting for the first place in every mile of the grind. Rickenbacher and De Palma were at it again and they were both being fought at every stage of the game by Joe Cooper and his Stutz who took the third place and who was a leader at one stage of the game until tire trouble put him back. Lewis and his Crawford registered again when they won the fourth position in the shorter race and Henderson, second man in the 150-mile race, was fifth, with Galvin and his Sunbeam registering in for the sixth position.

Of the \$10,000 given in prizes for the winners of the two races, De Palma carried away the largest share with \$3,000 for first in the long race and \$500 for second in the 50-mile event. Henderson and Rickenbacher won \$1,500 apiece and the rest of the money was divided among contenders who won thirds, fourths, and minor positions.

A. A. A. Temporarily Lifts Ban on Grand Rapids Track

GRAND RAPIDS, MICH., June 24—The A.A.A. contest board, through Chairman Kennerdell, having raised the ban on the local track for 1 day, it ordinarily being an outlaw track, the Automobile Business Assn. has promoted a 100-mile race for July 8 for cars under 450 cu. in. displacement. It is said that Ralph de Palma will drive his Mercedes, Ralph Mulford will pilot his Hudson and Gil Anderson will compete in a Premier.

There will also be a 5-mile amateur free-for-all elimination race, and an invitation Ford race with a final heat of 5 miles, this under Class E, non-stock classification.

Benton Harbor, Mich., is also to have a sanctioned ½-mile meet on July 4.

Saxon 300-Mile Non-Stop Run

2000 Dealers All Over Country To Start Car and Motor Test on July 1

DETROIT, MICH., June 24—The Saxon Motor Car Corp. has laid plans for the staging of what is said to be one of the largest non-stop runs ever held, this to be a test conducted in all parts of the country by the 2000 Saxon dealers who will each run 300 miles without stopping his motor.

The tests will be conducted individually by the dealers, and in each car an official observer who is a newspaper man. A large silver loving cup is to be presented to the dealer who attains the best mileage record per gallon of gasoline.

In addition to keeping an accurate record on all the gasoline and oil used on his run, each entry will also check up on whatever mechanical attention or adjustment is necessary. The run is to take place on July 1.

Buick Wins Canadian Reliability

OTTAWA, ONT., June 20—The reliability tour from the Canadian capital into the State of New York which took place last week-end, excited a great deal of interest all along the route. It not only gave motorists a chance to sample the terrible roads between Ottawa and Prescott, which was the first leg of the journey, and conditions were made worse than ordinary by a heavy rainfall of 18 hr., directly before the start, following on several weeks of more or less continuous rain, but it also enabled an impetus to be given to the Good Roads movement in Ontario, as well as permitted the celebration of the exchange of licenses between Ontario and New York State by a large body of motorists. McLaughlin-Buick cars carried off the first four prizes, the winner being G. B. McKay, who finished the run to Gouverneur with a perfect score of 1000 points, this car not even losing a point on the secret schedule run. The fifth prize went to a Dodge car, and the sixth to an Overland, while the McLaughlins were the next three in order to finish on points, followed by a Russell, Ford, Chevrolet and Brisco.

Dealers See New Buick Four

FLINT, MICH., June 24—This week has been a sort of get-acquainted meeting at the Buick factories here. Buick dealers from various sections have been brought to the city, some sections coming by special trains, others by boat, etc. One of the objects of the gathering was to meet the new general sales manager, E.

F. Strong, who succeeded B. H. Collins, resigned. Another was to get a view of the new Buick four-cylinder car, that is to be put on the market both as a touring car and roadster. The convention was addressed by W. C. Durant, president of General Motors, and the selling organization was also informed of the election of W. P. Chrysler to the general managership of the Buick company.

Chalmers Branch in Salt Lake City

DETROIT MICH., June 27—With the intention of erecting a branch and warehouse to take care of the district, the Chalmers organization has incorporated the Chalmers Motor Sales Co. at Salt Lake City, Utah, with a capital of \$200,000. W. P. Kiser is secretary.

Allen 4-Day Convention July 17

FOSTORIA, OHIO, June 24—The Allen Motor Co., this city will hold its annual convention of distributors on July 17 and the following 4 days. Monday will be spent at the main factory in Fostoria, Tuesday at the motor plant in Bucyrus, Wednesday and Thursday will be devoted to a tour taking in points of interest in northern Ohio, including Cleveland and Put-in Bay.

Eight New Contracts for Bosch

NEW YORK CITY, June 26—These companies have signed contracts to use Bosch magnetos for the coming season: Mercer Automobile Co., Trenton, N. J.; Diamond T. Motor Car Co., Chicago; Thomas Evarts Adams, Inc., New York; Detroit-Wyandotte Motor Truck Co., Wyandotte, Mich.; Autocar Company, Ardmore, Pa.; Rochester Carriage Co., Rochester, N. Y.; Stegeman Motor Car Co., Milwaukee, Wis.; Republic Motor Truck Co., Alma, Mich.

Texas Dealers Get Army Business

EL PASO, TEX., June 26—Accessory and tire concerns of El Paso are breaking business records every week. Sales have been unusually heavy this year, even leaving the army business out of consideration. Last week one army contract called for \$35,000 of solid rubber tires. It is believed that the average amount spent weekly in El Paso for motor supplies for Uncle Sam is in excess of \$25,000.

Deaco Creditors' Final Dividend

DETROIT, MICH., June 27—Final dividend to the creditors of the defunct Detroit Electric Appliance Co., maker of the Deaco starting and lighting equipment, has been paid by the Detroit Trust Co., trustee. The final payment checks amount to a little over 3 per cent, bringing the total received by the creditors to about 23 per cent, they having previously received 20 per cent of their claims.

Henning Wins at Galesburg

Ogren Pilot Covers 100-Mile Course at 58.5 m.p.h.—Duesenberg Second

GALESBURG, ILL., June 22—Following two postponements, caused by rain, the third annual 100-mile race was held on Galesburg's mile dirt track and Otto Henning, driving an Ogren car, won first money. Owing to the condition of the course the time was slow, 1:42:34.60, an average of 58.5 m.p.h.

Second to the winner came George Buzane in a Duesenberg. His time was 1:43:15.05, an average of 58.2 m.p.h. Andy Burt in a Stutz was third in 1:44:20.75, or at 57.5 m.p.h., while Art Klein in a Klein Special was fourth in 1:45:22.25, an average of 57 miles per hour. Klein was the hard-luck driver of the contest, for he lost the race after leading the field for 87 miles. Ralph Mulford and Ira Vail, both driving Hudson Super-sixes, were put out of the race early by mechanical troubles. Mulford broke a valve spring and piston and Vail burned out a bearing. Other drivers who competed but who failed to get inside the money were Jack Gable in the Burman Special, Harry McNay in a Cino, Tommy Milton in a Mercer Special and C. R. Parker in a Duesenberg.

Henning went in as a post entry, reached Galesburg after a hard drive of 2 days over muddy roads and then had failed to show up when the field was lined up for the start. The race was held 5 min. and just as the motors had been cranked for the getaway Henning appeared. Without time even to visit his pit the Chicago driver got away in last place.

Then Klein was forced to make a short stop at his pit to fix a broken terminal and Henning gained a half lap. It was neck and neck for another 15 miles, with Henning steadily gaining. Then when Klein had to stop for a tire change that took but 31 sec., Henning went into the lead and was not again headed. Klein's hard luck stuck with him, for he ran out of gasoline near the finish of the race and dropped back to fourth place.

100 Tractor Firms in Demonstration

ST. LOUIS, MO., June 24—The St. Louis Tractor Farming Association, organized to give the National Farming Demonstration here July 31 to Aug. 4, announces that 100 firms have signed exhibition agreements for the demonstration and that a 2000-acre tract of wheat land has been obtained for the tractor contests.

Separator Ordinance Sustained

Suit Between Garagemen and N. Y. City Settled—Law To Be Enforced

NEW YORK CITY, June 26—The gasoline separator ordinance against which the dealers and garagemen of New York City have fought for years has been sustained by the courts. Prosecutions under the ordinance have been held up by the authorities depending on the issue, and it is stated that enforcement of the law will now be required. This ordinance requires the installation in every garage of a device which is designed to separate from the floor sewage any escaping oil or gasoline.

The devices have proved expensive, costing from \$200 up, and the automobile interests have maintained that the separators will not do the work and are a needless expense. Exhaustive tests have been made by both sides in the controversy.

The dealers succeeded in having the ordinance repealed by the Board of Aldermen, but their repeal was vetoed by the Mayor and an attempt to pass the repeal over his veto failed.

The Bronx Garage then brought a mandamus action to require the issuance of a garage permit in the garage which had no separator. A jury trial was secured and the decision was favorable to the dealers, but the city carried an appeal to the Appellate Division of the Supreme Court and the latter has decided that the jury trial was improper and that the ordinance is essential to the welfare of the city. The motor car interests are considering further steps in the matter. The Court of Appeals is the only remaining higher court in the State of New York and any further step likely would constitute an appeal to this tribunal.

Receiver for Star Motor Car Co.

ANN ARBOR, MICH., June 24—Judge E. D. Kinne in the Circuit Court here has appointed A. D. Groves of this city receiver for the Star Motor Car Co., which produces a light truck. The receiver will determine whether or not it is advisable to continue the concern as a going business or sell it.

Creditors Wind Up Affairs of Detroit Body Co.

DETROIT, MICH., June 20—At a final meeting of the creditors of the defunct Detroit Body Co. before Referee Lee E. Joslyn here to-day, the affairs of the bankrupt were wound up. This concern, which was adjudicated a bankrupt

on April 20, 1915, owned a large body factory in the northeastern manufacturing center of the city. The total indebtedness was \$329,650, and the trustee realized by sale of the assets, \$260,983. Of this amount, \$242,195 was paid to secured creditors, and a dividend of 8 per cent has already been paid to the unsecured creditors. It is understood that a further dividend of from 3 to 4 per cent will go to the latter when the estate is finally closed up.

International Automobile League President Arrested

WASHINGTON, D. C., June 24—Following a hearing before W. H. Lamar, solicitor-general of the Post Office Department, Alfred C. Bidwell, president of the International Automobile League, Inc., of Buffalo, was arrested by Federal authorities. The hearing was upon an application by Richard H. Lee, of Cleveland, chairman of the legislative committee of the American Automobile Assn. for a fraud order refusing the league and the International Automobile, Tire & Rubber Co., of California, a further right to use the mails on the ground that they were making promises they could not keep. It is claimed that many thousand persons joined the league on a promise they would obtain automobile supplies at reduced or wholesale prices, the annual assessment being \$10. Bidwell furnished bond in the sum of \$5,000 for his appearance before United States Commissioner Taylor here on July 18. It is stated that a fraud order was issued against the league and that counsel for Bidwell has until July 18 to file a brief in the case. A warrant alleging violations of sections of the penal code respecting the use of the mails was sworn out and Bidwell's arrest followed.

Chalmers Sub-Dealers Convene in Detroit

DETROIT, MICH., June 24—More than fifty sub-dealers of the Chalmers Michigan organization, operating under the Michigan distributor, the L. J. Robinson Co., were in the city this week for a 2-day convention to view the 1917 Chalmers cars and to formulate plans for a furtherance of business for the coming season.

Talks were given by President Hugh Chalmers, C. A. Pfeffer, vice-president; Paul Smith, vice-president of the selling division; L. J. Robinson and Harry Newman of Chicago. A big drive-away of new models closed the meeting, and took many of the new cars away from Detroit.

Overland Opens New Branches

TOLEDO, OHIO, June 27—In line with its sales expansion policy, the Willys-Overland Co. has taken steps to facilitate distribution by the opening of new

branches at Denver, Col., Jacksonville, Fla., and Omaha, Neb., in addition to increasing its facilities at Columbus, Ohio, Springfield, Mass., and in its home city of Toledo. Buildings have been acquired in the first three named cities, and remodeling and other expansion is being carried on in the latter three. At Toledo, the Atwood Automobile Co., which was the dealer, has been purchased outright to be hereafter conducted as a factory branch, and A. A. Atwood and C. T. Atwood who conducted the local agency have been taken into the Overland organization, the management of the Toledo branch being now under G. C. Morgan.

C. T. Dunkle has been put in charge of the Columbus branch, following the acquiring of the business of O. G. Roberts, former Overland distributor here, the conversion of this location into a service plant, the acquiring of another site for salesroom, and the leasing of the plant formerly occupied by the Columbus Buggy Co. as a storage space. Calvin Eib will be in charge of the Denver branch; and J. R. Jamison is to operate the Omaha branch, having been the dealer there prior to the factory representation. G. H. Johnson, from the Toledo offices, goes to Jacksonville to manage that branch. M. T. White, former Stevens-Duryea official, takes charge of the newly erected branch at Springfield.

\$6,000 for Krit Creditors

DETROIT, MICH., June 24—The creditors of the defunct Krit Motor Car Co. will get final dividend checks this week from Referee in Bankruptcy Lee E. Joslyn, the total amount to be distributed being \$6,000, bringing the total paid to 5 per cent on \$850,000 of allowed claims. The Krit concern was adjudicated bankrupt in December, 1914, and prior to that time had been operating for several months under a creditors' agreement, whereby they were paid about 30 per cent of their claims.

To Sell P. R. Assets Separately

DETROIT, MICH., June 24—Following the placing of the P. R. Mfg. Co., maker of automobile parts and accessories and electric bells, in the hands of a receiver last fall as a result of a disagreement among the directors of the company as to the financial policy to be followed by the management, and the subsequent operation of the plant as a going concern under the receivership of the Security Trust Co., this city, it has now been decided by the Trust company that it will be more advantageous to the creditors and stockholders to sell the real estate of the corporation separately from the tools, equipment and stock. It was the original intention to dispose of the property as a whole as a going business, but the parcel plan was adopted later.

Factory Miscellany

To Make Spark Plugs—The Long Distance Spark Plug Co., Birmingham, Ala., has been incorporated with a capital stock of \$10,000 by Solon Jacobs, H. C. Pogue and others. Its factory, located at another point, will be removed to Birmingham.

Barberton Tire Co. to Build—The Punctureless Auto Tire Co., Akron, Ohio, is planning to build a factory at Barberton, Ohio.

Studebaker to Build in St. Paul—The Studebaker Corp., Detroit, is planning to build a plant in St. Paul, Minn.

Firestone Power Plant Burns—Fire practically wiped out the powerhouse of the Firestone Tire & Rubber Co. plant in Akron. An electric transformer blew up, burning out all electric wiring and rendering the plant powerless.

Resilient Wheel Starts Work—The Resilient Auto Wheels Co., organized recently at Wausau, Wis., has started manufacturing operations in the factory building at Ninth Avenue and West Street. Shortage of steel supplies has delayed the company in getting started, but production is now well under way. Fifty skilled men are employed at this time and the force will be increased to eighty and 100 as rapidly as competent help is available. J. E. Berglund is general manager.

Continental Truck to Build—The Con-

tinental Motor Truck Co., Superior, Wis., has awarded all contracts for the erection of its new motor truck factory, which will be 80 by 200 ft. in size, and of reinforced concrete, brick and steel construction. The company has been operating in leased quarters for several years, but these now are entirely inadequate.

American Brass Foundry to Move—The American Brass Foundry Co., 198-202 Milwaukee Street, Milwaukee, Wis., which has been engaged in the manufacture of motor car accessories in connection with its casting business, will move July 1 to larger quarters at 1916-1920 St. Paul Avenue. Hereafter the company will devote its attention exclusively to motor car parts and accessory work and will discontinue the foundry business. The Allis Fire Extinguisher Co., 434 Jefferson Street, has leased the old quarters on Milwaukee Street and will take occupancy as soon as an additional story is erected.

Third Goodyear Stack Finished—The last brick in the third stack which for 2 weeks has been in the process of erection at the Goodyear Tire & Rubber Co., Akron, Ohio, was cemented in place recently. The stack just completed is 21 ft. 6 in. in diameter at the bottom, tapering to 15 ft. 6 in. at the top, which is 250 ft. above floor level.

About 1585 tons of brick entered into

the construction of the big shaft, each one of which was placed in position without the use of plumbline or other instrument to determine perpendicularity of the stack.

Through the use of specially designed radial blocks of refractory red clay, so constructed as to fit together to give the proper degree of taper, the stack was built up with no other instruments than the brick mason's trowel and level. It rests on a solid rock foundation, leveled over with concrete, and is equipped with both inner and outer steel ladders, with rungs 18 in. apart.

Goodyear now has the three highest stacks in the State, all of which have been built to withstand a wind velocity of 100 m.p.h. The erection of a fourth stack of the same height will be commenced soon for the new mechanical goods and chemical plant, about a mile up the Little Cuyahoga River from the main Goodyear Tire & Rubber plant in Akron.

To Make Bodies—Commercial Auto Body Co., St. Louis, has been incorporated with \$50,000 capital stock; the holders are Hugh F. Cartwright, 498 shares; M. E. Cartwright and X. F. Wilfey, one each. Mr. Cartwright has been conducting a factory at Sixteenth and Pine Streets and during the last year turned out 10,000 bodies. The capacity will be enlarged.

The Automobile Calendar

ASSOCIATIONS

- July 9-13—Detroit, Mich., World's Salesmanship Congress, Detroit Board of Commerce Bldg.
- Sept.—Indianapolis, Convention for Formation of Indiana Automobile Trade Assn., under auspices of N. A. T. A., Hotel Claypool.
- Oct. 2-5—St. Louis, Fall Meeting Assn. of Automobile Accessory Jobbers.
- Dec. 2-9—Electricians' Country-wide Celebration.

CONTESTS

- July—La Grande, Ore., Track Race, LaGrande Motor Club.
- July 4—Coeur d'Alene, Idaho, Race Meet, Hiller-Riegel Co.
- July 4—Tacoma, Wash., Speedway Race, Tacoma Speedway Assn.
- July 4—Minneapolis 300-Mile Speedway Race.
- July 4—Sioux City Speedway Race.
- July 4—Newark, N. J., Track Race, Olympic Park, Auto Racing Assn.
- July 4—Visalia, Cal., Road Race, Tulare Co. Auto Club.
- July 4—Spokane, Coeur d'Alene, Track Race, Riegel-Hiller Co.*

- July 4—Benton Harbor, Mich., Track Race, F. E. Fitzsimmons.
- July 4—Elmira, N. Y., Track Race, Elmira Auto and Motorcycle Racing Assn.
- July—Burlington, Iowa, 100-Mile Track Race, Tri-State Fair.
- July 15—Portland, Ore., Track Race, Northwest Auto Assn.
- July 15—Omaha, Neb., Speedway Race.
- July 15—North Yakima, Wash., Track Race, Hiller-Riegel Co.
- Aug. 5—Tacoma Speedway Race, Tacoma Speedway Association.
- Aug. 11-12—Pikes Peak, Col., Hill Climb, Pikes Peak Auto Highway Co.
- Aug. 12—Portland, Ore., Track Race, Hiller-Riegel Co.
- Aug. 18-19—Elgin Road Race, Chicago Auto Club.
- Aug. 26—Kalamazoo, Mich., 100-Mile Track Race.
- Sept. 1-2—New York, N. Y., Sheephead Bay Speedway, 24-Hour Race, Trade Racing Assn.
- Sept. 4—Elmira, N. Y., Track Race, Elmira Auto and Motorcycle Racing Assn.

- Sept. 4—Cincinnati, Ohio, Speedway, Cincinnati Speedway Co.
- Sept. 4—Newark, N. J., Track Race, Olympic Park, Racing Assn.
- Sept. 4—Indianapolis Speedway Race.
- Sept. 4—Des Moines Speedway Invitation Race. Limited to six entries.
- Sept. 4-5—Spokane, Wash., Track Race, Inland Auto Assn.
- Sept. 16—Providence Speedway Race.
- Sept. 18—North Yakima, Wash., Track Race, Washington State Fair.
- Sept. 29—Trenton, N. J., Interstate Fair, H. P. Murphy, Racing Sec.
- Sept. 30—New York City, Sheephead Bay Speedway Race.
- Oct. 7—Philadelphia Speedway Race.
- Oct. 7—Omaha Speedway Race.
- Oct. 14—Chicago Speedway Race.
- Oct. 19—Indianapolis, Ind., Race, Indianapolis Motor Speedway.
- Oct. 21—Kalamazoo, Mich., Track Races, Kalamazoo Motor Speedway.

- Nov. 16 and 18—Santa Monica, Cal., Vanderbilt Cup and Grand Prix Races.

GOOD ROADS

- Sept. 6-7—St. Paul, Minn., Good Roads Congress, Auditorium.

SHOWS

- Sept. 2-9—Columbus, Ohio, Fall Show, Ohio State Fair, Columbus Automobile Show Co.
- Sept. 10-16—Milwaukee, Wis., Show, Wisconsin State Fair, Machinery Bldg.
- Aug. 2-9—Hollywood and West End, N. J., Show, Atlantic Exhibition Co.

TRACTOR

- July 17-21—Dallas, Tex., Tractor Demonstration.
- July 24-28—Hutchinson, Kan., Tractor Demonstration.
- July 31-Aug. 4—St. Louis, Mo., Tractor Demonstration.
- Aug. 7-11—Fremont, Neb., Tractor Demonstration.
- Aug. 14-18—Cedar Rapids, Iowa, Tractor Demonstration.
- Aug. 21-25—Bloomington, Ill., Tractor Demonstration.
- Aug. 28-Sept. 1—Indiana Tractor Demonstration.
- Sept. 4-8—Madison, Wis., Tractor Demonstration.
- Sept. 11-16—Milwaukee, Wis., Fall Show, Wisconsin State Fair, Milwaukee Automobile Dealers.

The Week in the Industry



Minneapolis News—Bohn Fawkes, distributor for the Oldsmobile, has moved to a new building at Hennepin Avenue and Harmon Place.

The Brice Auto Co., representing the Grant, has moved to a new building at 1641 Hennepin Avenue.

E. A. Zolle, representing the Hupmobile retail, has moved to a new building at 1639 Hennepin Avenue.

The R. C. Smith Auto Co., distributor for the Velie and truck, the Regal and the Stewart truck, has moved to a new building at 1601-1603 Hennepin Avenue.

The Shattuck Trailer Co. has opened a general office and showroom at 1408-1410 Hennepin Avenue.

A. R. Curtis has opened a display of Curtis trailers and camp outfits at 1411 Hennepin Avenue.

The Twin Bed Trailer has opened a display in the Murphy Building at 1305-1309 Hennepin Avenue.

The Gray Motor Co. has opened a Studebaker service building at Fifteenth Street and Laurel Avenue.

Mich. Items—C. M. Johnson, Alma, Mich., Ford and Overland distributor for Gratiot County, has purchased the garage, supplies and equipment of A. C. Wyant, Reo and Chalmers distributor, on East Superior Street.

E. C. Seale and C. C. Van Veen, Detroit, have purchased the Acme Tire & Repair Co. business at 226 Jefferson Avenue. The company is to be renamed the Acme Tire & Supply Co. and headquarters will be at 1745 Woodward Avenue. The firm will do a general repair business and will handle tires of all popular makes.

Ill. News Items—Judd Seacord & Son, Galesburg, have opened a used-car department on the public square, leasing the building formerly occupied by the Square Garage Co., and will hereafter utilize this structure for second-hand cars exclusively. Lack of room in the North Kellogg Street main building necessitated additional quarters. A separation of the new and old cars was also thought to be an advantage. The Square Garage Co. has moved to a new building on North Cherry Street. Hereafter repair work alone will be given attention.

R. S. Bassett, Elgin, has disposed of his stock in the Elgin Motor Sales Co. to C. E. Heslet and C. C. Gale, both of Michigan City, Ind., and the new owners took possession this week. The business will be continued under the same corporate name. S. S. Bassett, who has been manager, will be retained in the same

capacity. Various improvements are planned and the business will be expanded in several ways.

Luckey New Orleans Edison Mgr.—The Edison Storage Battery Supply Co. has established a new sales office at New Orleans and has appointed C. A. Luckey as resident manager.

Mr. Luckey is a graduate of Franklin Military Academy, Franklin, N. Y., 1899, and Bliss Electrical School, Washington, D. C., 1900-1901. He was connected with the Western Electric Co., New York city, during 1901-02, leaving there to go with the Safety Car Heating & Lighting Co., where he remained until 1911, spending the first 4 years in its electrical laboratory and then going with the Chicago branch.

In 1911 Mr. Luckey was with the Railway Utility Co., Chicago. In 1912 he joined the sales force of the Edison Storage Battery Co., Orange, N. J., and was attached to the sales office in Chicago, where he has been until his present appointment.

Mr. Luckey's new address will be Edison Storage Battery Supply Co., 201 Baronne Street, New Orleans, La.

Ohio News Items—The King Sales Co., Toledo, northwestern Ohio agent for the King, will soon move into new quarters on Motor Row. E. A. Wilkinson, president of the company, recently purchased the stock and business of the Madison Garage, conducted by M. M. Mull. The United Garage Co. of Toledo, Ohio, agent for the Reo, has added a line of accessories to its sales and garage business.

The E. F. Loeffler Rubber Co., 85 East Gay Street, Columbus, has been succeeded by the Central Tire & Repair Co., with T. O. Pickering as manager.

C. M. Logan has been made president of the Logan-Fischer Motor Co., 1900 East Nineteenth Street, Cleveland, agent for the Chalmers. C. F. Fischer is vice-president. Paul Smith will be in charge of advertising.

Louisville Items—O. R. Crutcher, distributor for the McFarlan car, has opened an office and salesroom at 206 East Broadway.

The Peoples Motor Co. has acquired the agency for the Inter-State and established headquarters at 951 South Third Street.

The Winklemann-Schade Motors Co. has organized and opened a temporary office and salesroom at 949 South Third Street. The concern has been appointed Maxwell distributor in this territory. W. F. Winklemann, head of the company,

was formerly sales manager of the Southern Motors Co.

The Louisville Tire Co., distributor for the Empire, has opened an office and salesroom at 407 East Broadway.

New England Trade News—The Bunker-Bancroft Co., agent for the Elcar at Springfield, Mass., has added the Apperson to its line.

The Peckham Brothers Co., Providence, R. I., has bought a large lot of land on which it will erect a salesroom and service station.

J. W. Cobb, formerly with the Cadillac company of Boston, Mass., has gone to Greenfield, where he has taken the agency for the Cadillac for Franklin County.

The Richmond Garage & Motor Co. of Boston, Mass., has petitioned the supreme court to allow it to wind up its business.

Philadelphia Items—D. K. Moore, formerly of the Weston Motor Co., the Federal Mfg. Co. and the American Distributing Co., has been made assistant general manager of production of the Vim Motor Truck Co., Philadelphia.

The Gorson Automobile Exchange, 238-240 North Broad Street, Philadelphia, purchased the building at Broad and Melon Streets, and will build a four-story building containing four stores on the site. The purchase price was \$70,000.

T. W. Simpson has resigned as sales manager of the Philadelphia branch of the Oakland Motor Co., 227 North Broad Street, to become district manager for the New England States of the Grant Motor Car Co. S. K. Patteson, one of the oldest men in point of service with the Oakland here, succeeds Mr. Simpson.

The Buick Motor Co., 235-237 North Broad Street, Philadelphia, has leased the six-story concrete building now being built at the northwest corner of Broad and Poplar Streets, which will be used exclusively by the local branch for wholesale and retail purposes. The present quarters will be vacated Sept. 1, when the transition will be made. The new building has a frontage of 65 ft. on Broad Street and a depth of 160 ft. on Poplar Street.

Seeback N. Y. Chevrolet Mgr.—L. J. Seeback, formerly manager of the Brooklyn branch of the C. T. Silver Motor Co., New York City, and later of the Newark branch, has been appointed manager of the New York City sales of the Chevrolet Motor Co.

GURNEY



EVERY industry has its accepted leader, the manufacturer whose name carries instant conviction of supreme attainment.
 When we buy his goods all thought of price is lost in Pride of Possession; the purchase of other makes calls for explanation—almost apology.
 Such leadership comes not by chance. Only long years of unremitting effort enable us now, by reason of the present state of perfection of

GURNEY BALL BEARINGS

with their inbuilt superiority an actually demonstrated and determined quantity, safely to assert that
 FROM THE STANDPOINT OF EFFICIENCY THEIR EQUAL DOES NOT EXIST

GURNEY BALL BEARING COMPANY

"Conrad Patent Licensee"

JAMESTOWN - - - NEW YORK

Please mention The Automobile when writing to Advertisers



"In planning our models for the coming year it has been decided to accept your recommendation that

"I have studied this question thoroughly and am convinced that the four types of New Departures afford a bearing suited to every requirement of light or heavy duty.

"Take for instance the Double Row Type. It will carry the heaviest axle loads and resists the severest shocks and stresses that occur in all parts of the car mechanism. I know that to be a fact.

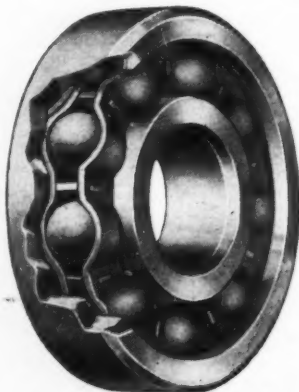
NEW DEPARTURE BALL BEARINGS

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be used throughout every car we build," said the Manufacturer to his Chief Engineer.

"I am satisfied that New Departure Ball Bearings in these new models will reduce our manufacturing costs and enable us to offer cars, practically frictionless in operation and hence economical throughout a lifelong service.

"Before going ahead it would be well to consult with the New Departure Engineering Department. I find the company always ready to make recommendations for the proper use of its bearings."



New Departure Single Row

A lightly perfected anti-friction Bearing for use where radial loads only are to be carried.

"Moreover, the Double Row needs no adjustment, no auxiliary bearings to assist it in the full performance of its functions, it is, therefore, the simplest of all bearings, the easiest to install.

"I have visited the New Departure plants at Bristol and Hartford and am satisfied that no better material and workmanship exist in any bearing.

The NEW DEPARTURE MFG. CO.
BRISTOL, CONN., U. S. A.

Conrad Patent Licensee

Western Branch: 818-20 Ford Bldg., Detroit

Distributors in Trade Centers Throughout the United States
Sole British Agents: Brown Bros., Ltd., London & Manchester.

For Continent of Europe: Jacob Holst, Copenhagen, Freeport, Denmark.



New Departure Double Row

A single, self-contained, "fool-proof" unit carrying all the loads and stresses simultaneously from whatever direction they may come, with equal efficiency, and reducing friction to the vanishing point.

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THE CLASS JOURNAL COMPANY
231-241 W. 39th STREET NEW YORK CITY

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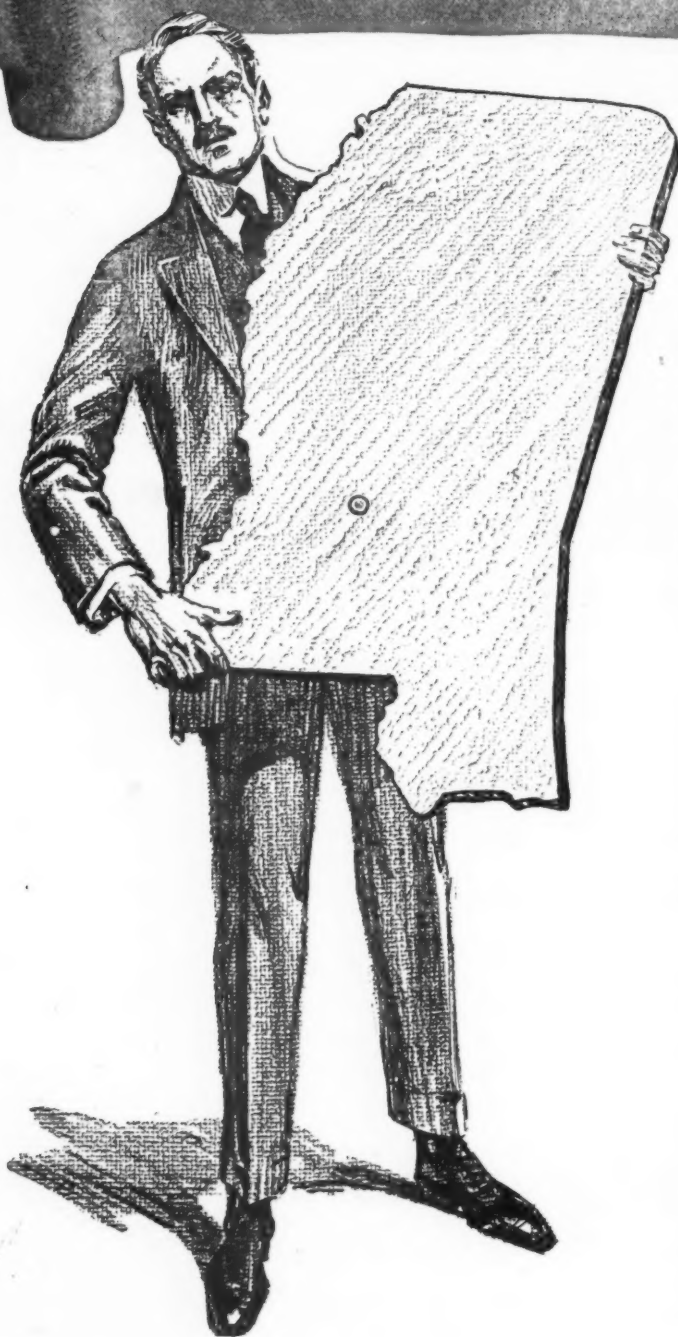
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BALL
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on most of the
high-grade igni-
tion apparatus,
lighting genera-
tors and starting
motors made in
America to-day.

The
NORMA COMPANY
of AMERICA

1790 Broadway, New York City





Look at this one in Mississippi—

The second largest city in the State both in population and industrial importance offers a big opportunity for a Studebaker dealer.

Five prominent railroads of the South make this city a terminal point. It is one of the recognized industrial centers in that section of the country. Cotton growing constitutes its chief agricultural occupation, while the manufacture of cotton seed oil, fertilizers and lumber supplies sufficient and well-salaried employment for this city of over 25,000 people.

Studebaker opportunities such as this are rarely offered. Usually there is strong competition among dealers on an occasion like this—so if you are interested write for the facts immediately.

STUDEBAKER

South Bend, Ind.

Detroit, Mich.

Walkerville, Ont.

Address all correspondence to Detroit

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"AGATHON" is a Greek word for quality—it was chosen as our trademark because it exemplifies the best of everything.

Our buildings are the most modern and all the equipment of the latest design and highest efficiency.

Every known improvement in advanced steel plant construction has been provided.

We have backed up our facilities with the best ability—every man from the General Superintendent down is of mature experience.

Our raw materials are selected for quality—we must have the best.

We have set up a high standard—"AGATHON" is the word that will insure you of this. "AGATHON" guarantees your satisfaction.

OUR PRODUCTS

"AGATHON" Chrome Nickel	"AGATHON" Vanadium
"AGATHON" Chrome Vanadium	"AGATHON" Chrome Steel
"AGATHON" Nickel Steels	"AGATHON" High Carbon
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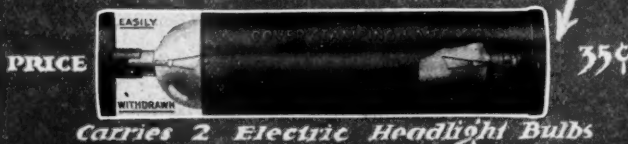
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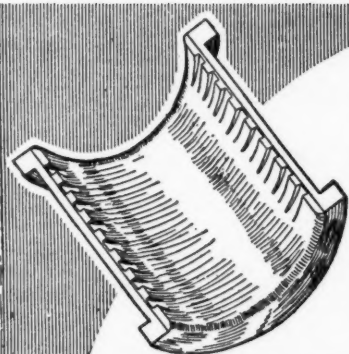


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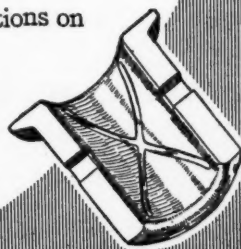
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Cylinders, crankcases and crankshafts welded.

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BURNLEY SOLDERING FLUX

Paste Form—Stays where it is put. For all metals except aluminum. Solder flows quick and even. Small can 15 cents, larger 25 cents—prepaid.

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We are the World's Largest Automobile Supply House. Buy from us and save money.

This week's specials are:

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Handsomely designed and finely finished in black; an excellent timekeeper.

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Made of solid steel; noted for its simplicity; one of the most practical on the market.

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Can be easily attached to any car; bar is handsomely finished in nickel; fittings are black enameled.

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This system will save each month in gasoline its original cost. Can be installed in any car.

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Fits any size spring; makes it possible to thoroughly lubricate each leaf.

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Powerful, compound, quick-acting, labor-saving pump. Most satisfactory in emergencies.

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Specially made for Ford Cars. Increases power of engine and makes starting easy.

Oil Gauge for Ford Cars.....\$0.18
Most useful accessory for Ford Cars; very easy to attach.

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This rail is especially made for Ford Cars; inexpensive and durable.

The above is but a partial list of our big bargains. Send for a copy of our "Price Wrecker" Catalogue, which shows and describes thousands of supplies and accessories—everything pertaining to the automobile.

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Refiller complete, Towel, Roll and Tube of Liquid price 50c. Antiseptic and Sanitary.

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Special terms to dealers and agents.
Write or wire for territory.

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Eliminates all Carbon Deposits. Gives complete Combustion. Engine will start better, run smoother and last longer. Will save 25 to 40% Gasoline. Contains no acid or chemicals. Analyzed by Expert Analytical and Consulting Chemists. Name on request. Use 1 ounce to each 5 gallons of gasoline. Will mix without stirring. Price \$1.50 quart. DEALERS—Write or wire for special proposition.

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Old Tops made like new and Waterproof by using

RUB-R-TITE

Easily applied. Small car size, 60c.; large car size \$1.00.

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30c FAN BELTS FOR FORDS 30c

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If you could be convinced that you could undoubtedly you would have done so before this, but you were skeptical.

**WILL YOU PROVE IT TO
YOURSELF AT OUR EXPENSE?**

Send for a \$1.00 tube of

C-A-R-B-O-N-V-O-I-D

which will treat 200 gallons of gasoline, 1 teaspoonful to each 5 gallons. If after using 5 teaspoonfuls to 25 gallons you are not convinced that you are getting from 5 to 7 miles more per gallon of gas, and that your carbon deposits are disappearing, send back the tube and we will cheerfully refund your money.

COULD WE DO MORE?

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Tires**A SAVINGS FOR YOU**

In Standard Guaranteed and Used Tires

Size	Used	New	Size	Used	New
30x3	\$4.50	\$ 6.00	34x4	\$ 8.00	\$12.00
30x3 1/2	6.00	7.80	34x4 1/2	10.00	17.00
32x3 1/2	6.00	7.00	36x4 1/2	10.00	17.90
33x4	9.00	11.85	37x5	12.00	21.00

10% deposit with order, balance C. O. D. subject to examination. Add 10% for Non-Skid Tires

SPECIAL

200 32x3 1/2 Straightside Plain Tread.....\$6.75 ea.

WRITE FOR OUR PRICE LIST ON ALL
STANDARD GUARANTEED TIRES

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A Guarantee of 4000 Miles

adjustable on that basis in accordance with guarantee as offered by leading tire companies, WITH EVERY TIRE LISTED BELOW:

These tires are Double Tread Tires, method of construction of which is brought down to such perfection that it absolutely SAFEGUARDS YOUR INNER TUBE, as well as give you far more mileage than new ones.

THIS IS NO IDLE BOAST; A TRIAL WILL CONVINCE YOU.

HIGH TIRE COST SHOT TO PIECES.

28 x 3	.....	\$4.75
30 x 3	.....	5.25
30 x 3 1/2	.....	6.50
31 x 3 1/2	.....	6.80
32 x 3 1/2	.....	7.35
34 x 3 1/2	.....	8.00
31 x 4	.....	8.25
32 x 4	.....	8.75
33 x 4	.....	9.20
34 x 4	.....	9.50
35 x 4	.....	9.85
36 x 4	.....	10.50
34 x 4 1/2	.....	10.95
35 x 4 1/2	.....	11.20
36 x 4 1/2	.....	11.75
37 x 4 1/2	.....	12.20
35 x 5	.....	12.65
36 x 5	.....	13.00
37 x 5	.....	13.45
38 x 4 1/2	.....	14.60

NO PUNCTURES, BLOW-OUTS, NO ANNOYANCE NOR INCONVENIENCE WHEN YOUR CAR IS EQUIPPED WITH ABOVE TIRES.

One Dollar or deposit sufficient to defray express charges required with each order. Shipments sent promptly C.O.D. SUBJECT TO YOUR INSPECTION.

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1622 So. Wabash Ave.,
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Before Buying Double Tread Tires

send us your old Tire and we will Double Tread it at the following prices:

Size	Price	Size	Price
30x3 1/2	\$4.50	34x4	\$6.00
32x3 1/2	5.00	36x4 1/2	8.00
33x4	6.00	37x5	9.00

LEON JAFFESS, INC.

252 West 55th St., New York City

DOUBLE SERVICE TIRES

Guaranteed 3500 Miles

Size	Plain	Tubes	Size	Plain	Tubes
30x3	\$5.00	\$2.05	36x4	\$9.00	\$3.80
30x3 1/2	6.00	2.40	36x4 1/2	10.00	4.60
33x4	8.00	3.45	36x5	11.00	5.45
34x4	9.00	3.60	37x5	11.00	5.55

Non-skid Tires, all sizes, \$1.00 Extra.

State if Q. D. straight bead or clincher type
10% Deposit required on all C. O. D. orders.
Discount of 5% when cash accompanies order.
I. Jaffess, 1319J Fifth Ave., New York.
Branch—282J Halsey St., Newark, N. J.

NEW BLEMISHED TIRE BARGAINS

(3,500-Mile Guarantee)

30x3	.....	\$6.00	34x4	.....	\$12.50
30x3 1/2	.....	7.50	36x5	.....	17.00
We Double Tread your old tires and guarantee perfect satisfaction. Give us a trial.					
For recovery, 30x3	\$4.00	30x3 1/2	\$4.50
Non-Skid 10% Extra.					

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A Great Saving On 4000 Miles Guaranteed Tires and Tubes

Our tires are guaranteed to give service up to 4000 miles under fair usage, and claims for insufficient mileage will be adjusted on a mileage basis when casings are returned by prepaid express.
Our casings are not guaranteed against bottle cut, rock cuts of being run flat.
Prices will soon be forced to rise.

ORDER NOW

NEW, GUARANTEED FIRSTS, TIRES AND TUBES AT SACRIFICE PRICES
For a short time only.

Size	Tires	Tubes	Size	Tires	Tubes
28x3	\$4.95	\$1.55	34x4	\$12.60	\$3.15
30x3	6.50	1.90	36x4	13.30	3.10
30x3 1/2	8.00	2.10	37x4	13.75	3.20
31x3 1/2	8.05	2.20	34x4 1/2	15.45	3.40
32x3 1/2	8.55	1.95	35x4 1/2	16.35	3.80
34x3 1/2	9.05	2.10	36x4 1/2	16.15	3.90
36x3 1/2	10.20	2.35	37x4 1/2	16.65	4.20
32x4	10.85	2.00	36x5	17.55	4.55
33x4	12.10	2.95	37x5	18.90	4.65
35x4	12.85	3.10	37x5 1/2	23.50	5.10

Add 10% for non-skid.

Our used tires listed below GUARANTEED 1500 MILES and adjustable on that basis in accordance with the above guarantee. This gives you an opportunity to equip your car with used tires and be protected.

Size	Tires	Tubes	Size	Tires	Tubes
30x3	\$3.50	\$1.20	36x4	\$7.35	\$1.85
30x3 1/2	4.25	1.30	32x4 1/2	6.65	1.60
32x3 1/2	4.95	1.40	34x4 1/2	7.60	1.65
30x4	4.75	1.40	35x4 1/2	7.65	1.60
31x4	6.15	1.80	36x4 1/2	7.95	1.70
32x4	6.65	1.65	37x4 1/2	9.05	1.90
33x4	6.90	1.55	35x5	8.10	1.90
34x4	7.35	1.60	36x5	9.05	1.95
35x4	7.15	1.70	37x5	9.25	2.10

Add 10% for non-skid.

These prices for new and used tires tell the story.

NO SALESMANSHIP NECESSARY

One dollar or deposit sufficient to defray express charges required with each order. Shipments made promptly C. O. D. SUBJECT TO YOUR INSPECTION.

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DOUBLE TREAD TIRES GUARANTEED 3500 MILES

We save you 33 1/3% to 50%.

Size	Plain	Skid	Size	Plain	Skid
30x3	\$4.90	\$5.90	33x4	\$7.85	\$8.85
30x3 1/2	5.75	6.75	34x4	8.75	9.75

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JAFFE BROS. CO. 260 W. 54th St. New York City

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COWANS BROS.

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GREAT SAVING, SMALL COST

average 3000 miles

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when you Double Tread your tires. This liner, made of two pieces of highest grade tire fabric with a layer of chrome leather vulcanized between, keeps the heavy stitching, used to Double Tread your tires, from cutting or puncturing your inner tube.

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Buy your tires from us and save money. Compare our prices with others.

Size	Plain	Non-Skid	Tubes
28 x 3	\$5.25		\$1.80
30 x 3	5.50	\$6.75	1.90
30 x 3 1/2	6.95	7.50	2.15
32 x 3 1/2	7.95	8.75	2.25
34 x 3 1/2	8.85	9.75	2.35
30 x 4	9.45	10.50	2.85
31 x 4	9.65	10.60	2.95
32 x 4	9.75	10.75	3.05
33 x 4	9.85	10.85	3.10
34 x 4	9.95	10.95	3.20
35 x 4	10.45	11.45	3.30
36 x 4	10.95	11.95	3.35
34 x 4 1/2	12.45	13.45	4.00
35 x 4 1/2	12.95	13.95	4.10
36 x 4 1/2	13.50	14.50	4.15
37 x 4 1/2	14.45	15.45	4.25
35 x 5	15.00	16.00	4.90
36 x 5	15.45	16.45	4.95
37 x 5	15.95	16.95	5.05

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Size	New Tires	New Tubes	Size	New Tires	New Tubes
28x8	\$6.00	\$1.25	34x4	\$13.25	\$3.35
30x8	6.50	2.00	35x4	13.50	3.45
30x3 1/2	8.00	2.25	36x4	14.00	3.50
31x3 1/2	8.50	2.50	34x4 1/2	16.25	4.00
32x3 1/2	9.00	2.50	35x4 1/2	17.00	4.15
34x3 1/2	9.50	2.55	36x4 1/2	17.50	4.25
36x3 1/2	10.75	2.75	37x4 1/2	18.00	4.35
31x4	11.75	2.90	35x5	17.50	5.00
32x4	12.50	3.20	36x5	18.50	5.00
33x4	12.75	3.25	37x5	20.00	5.20

Add 10 per cent to the above prices for non-skid.

Special bargains in slightly used and demountable tires.

Size	Used Tires	Used Tubes	Size	Used Tires	Used Tubes
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31x3 1/2	4.50	1.50	34x4 1/2	8.00	1.75
32x3 1/2	5.25	1.50	35x4 1/2	8.00	1.80
34x3 1/2	5.50	1.60	36x4 1/2	8.25	1.85
31x4	6.25	1.65	37x4 1/2	9.50	1.90
32x4	7.00	1.60	35x5	9.50	2.00
33x4	7.25	1.70	36x5	9.50	2.00
34x4	7.75	1.70	37x5	9.75	2.20

All goods shipped C. O. D. subject to examination on receipt of 10 per cent of order.

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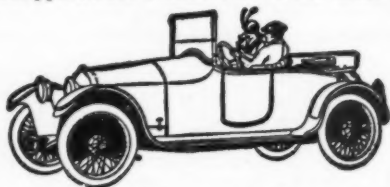
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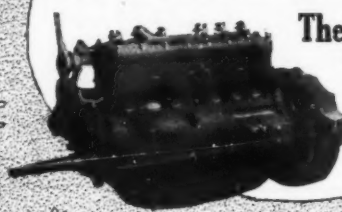
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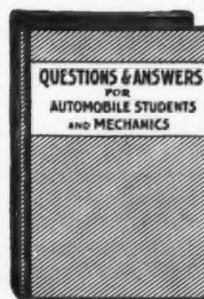
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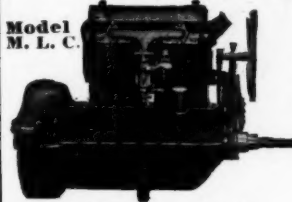
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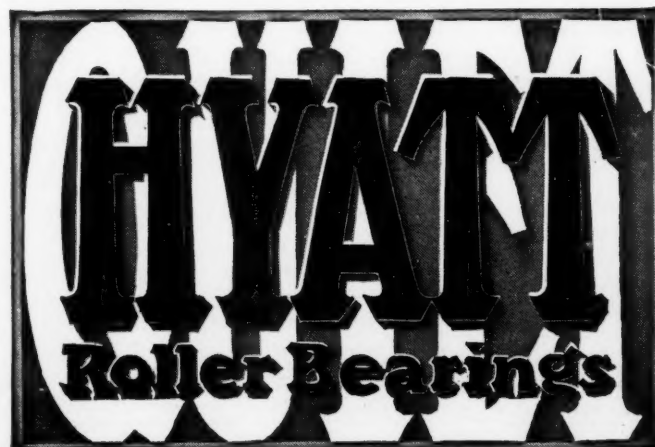
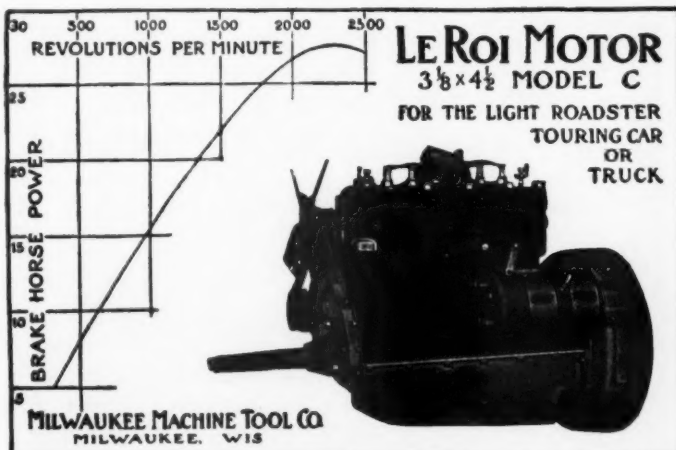
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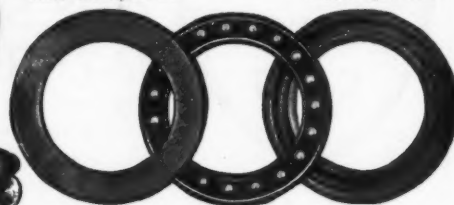
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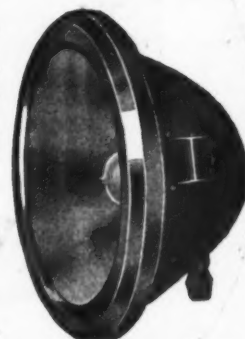
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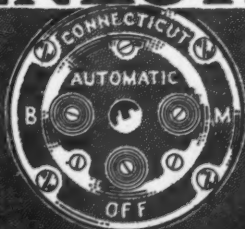
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The "Hold-On" Tread

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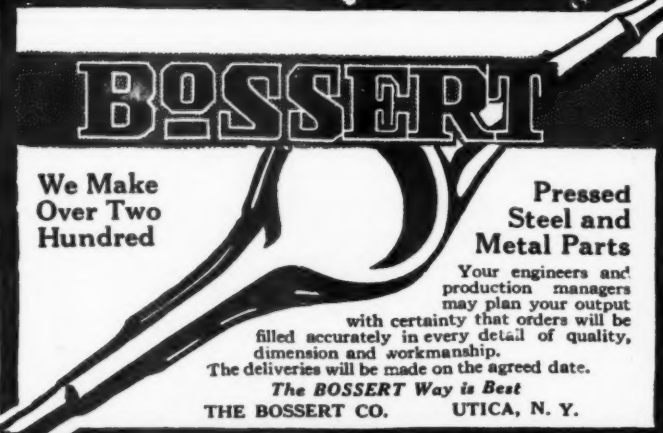
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is a distinguishing feature of these Screws and Rivets.

Securely welded Iridio-Platinum heads. Standard sizes carried in stock. Other styles to order—any specifications, any degree of hardness.

Write us for prices and full information.

R & H Platinum Works
of Roesler & Hasselacher Chemical Co.
100 William Street New York

BOSSERT



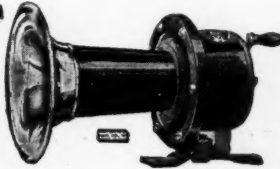
We Make Over Two Hundred

Pressed Steel and Metal Parts

Your engineers and production managers may plan your output with certainty that orders will be filled accurately in every detail of quality, dimension and workmanship. The deliveries will be made on the agreed date.

The BOSSERT Way is Best
THE BOSSERT CO. UTICA, N. Y.

\$4. SEISS Double Acting Horn



Operated by touch of hand either to right or left—for short sharp blast—or for long continuous sound same as a motor driven Horn. This is the only horn on the market having these features.

Guaranteed for 10 Years

Positive in Action—no Ratchets—no Spring pressure to go against—simplicity—nothing to get out of order.

Write for Literature

THE SEISS MFG. CO. 456 DORR STREET TOLEDO OHIO

ZENITH CARBURETOR



KNOWN the world over as the zenith of simplicity and efficiency.

A precision instrument giving permanently, exact carburetion for your car.

Zenith Carburetor Co.
Detroit, Mich.

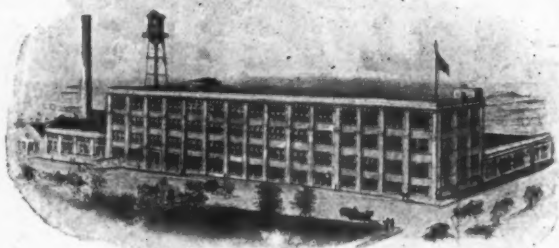


NOTE THE POWERFUL DRIVING LUGS.

HOUK

QUICK-CHANGE
WIRE WHEELS

HOUK MANUFACTURING COMPANY Buffalo N.Y.



Use the facilities of this perfectly equipped plant for the production of small sheet metal stampings of any design, also

BRASS CASTINGS

in the Rough, Polished or Nickel Plate

including Hub Caps, Radiator Filler Necks with Caps, Gasoline Tank Flanges with Caps, Gasoline Tank Flanges for Outlets, Hood Yokes, Ford Special Hub Caps and other parts made of Cast Brass.

Our Well-Equipped Wood-Working Department

is prepared for the prompt production of quantity orders of rough or highly finished wood-work assemblies of medium size for motor car construction, such parts as rest blocks for shipping, flooring boards, back spring boards, running boards, etc.

We work from Blue Prints and Specifications, but prefer, when possible, to also have samples for the purpose of securing positive accuracy in weight, measurements and design.

Write us at once for further information regarding the production of your requirements.

The Pfau
Mfg. Co.



Cincinnati
Ohio

FREE ROAD MAPS

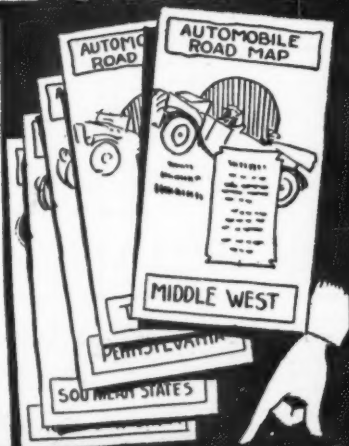
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Pittsburgh, Pa.



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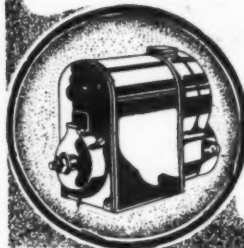
EISEMANN

MAGNETOS

The performance of any motor, however good, will be spoiled by undependable ignition. The manufacturers know this. They won't take chances. This is why Eisemann Magneto have been adopted as standard equipment by 108 Manufacturers of Trucks, Tractors, Pleasure Cars, etc.! Eisemann Ignition is powerful, dependable, a guarantee of a

SURE-FIRE SPARK

at low speed, at high speed, at any speed!



THE EISEMANN MAGNETO CO.

Sales and General Offices:
32-33rd Street, Brooklyn, N. Y.

Indianapolis, Ind., 415-417 N. Capitol Ave.
Detroit, Mich., 802 Woodward Ave.

In Every Instance

where Eclipse Piston Rings were installed in automobile engines the owners have attested that there was a tremendous increase in power.



This is *Proof*; the *Reasons* are in the Ring.

Send for Catalog and Price List.

Dealers should get our terms.

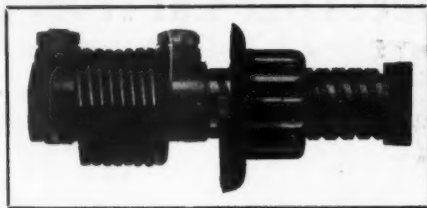
Manufactured by
HOPE MACHINE CO., Philadelphia, Pa.

THE EDWIN T. CRAVEN CO.

Sole Distributors

2310-12 N. 2nd Street

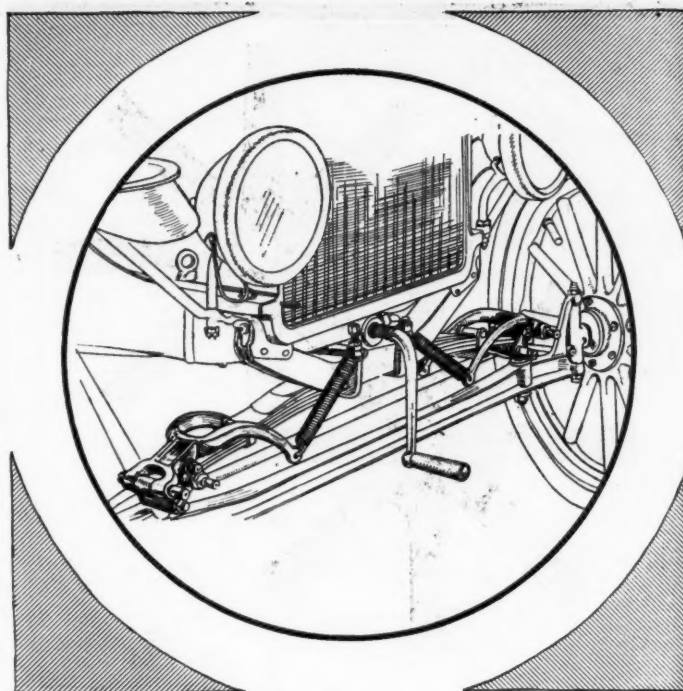
Philadelphia, Pa.



This is the famous
**ECLIPSE-BENDIX
DRIVE**

Used on Automobiles of
109 MAKES

ECLIPSE MACHINE CO.
Elmira New York



*The Aristocrat of
Shock Absorbers for Fords*

The Volcano Stables and Transportation Company of Hilo, Hawaii, came to America to buy Shock Absorbers. They bought W & C's. Why?

Because the W & C Shock Absorber is above the ordinary in workmanship, material, appearance and riding qualities. Because the W & C, with the malleable castings, milled surfaces, hard oilers, steel bolts, bronze bushings, and special alloy springs, are Guaranteed.

W & C
Original Double Arm
SHOCK ABSORBER

The price of the W & C Shock Absorber No. 1 as described above is \$10.00 per set of four. W & C No. 2 is identically the same as W & C No. 1, with the exception of hard oilers, steel bolts, and bronze bushings. The price of W & C No. 2 is \$5.50.

Price \$10 Set of 4

Convince yourself of the easy riding qualities by equipping your Ford today.

Dealers: We grant exclusive territory to thoroughly high-grade dealers. Wire or write today.

Manufactured by

Philip H. Webber Company
Hoopeston, Illinois

**SIMMS
MAGNETO
SIMMS-HUFF
ELECTRIC STARTING
& LIGHTING**

"The writer has had several years' experience with magnetos and motor generators and can say that the service that we have gotten out of your magnetos and generators on our cars, for the three years we have been selling them, has been very satisfactory."

We have sure tried out the Simms magneto and generator. Am more than pleased to state that the motor generator can not be beat. We would rather have it than any other system on the market today. It gives good service and will keep storage batteries up which is ninety per cent of the trouble with other motor generators of different makes.

We would be glad to recommend this system to anyone and cannot say enough for it."

Walnut Automobile Company,
Muncie, Indiana

Quality

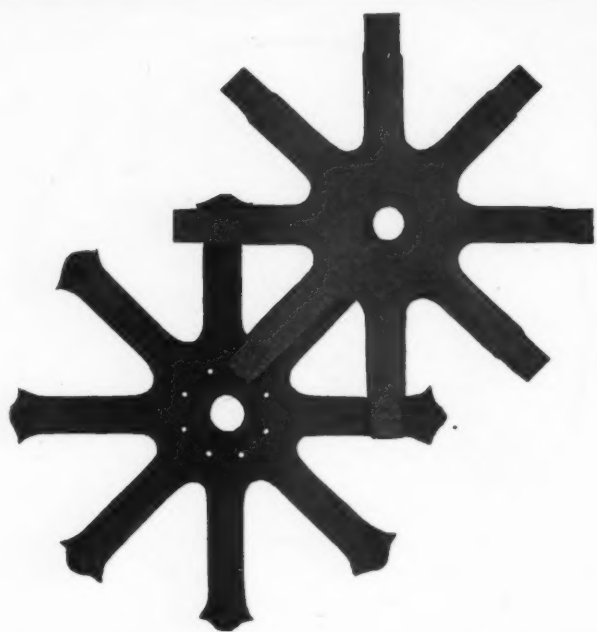
Reliability

Efficiency

The SIMMS MAGNETO CO.
East Orange, N.J.



Please mention The Automobile when writing to Advertisers



Two Pieces of Steel Plate

The enormous strength of Parker-Hydraulic Pressed Steel Wheels is due to the fact that the spider is formed from two pieces of steel plate welded together.

PARKER-HYDRAULIC PRESSED STEEL WHEELS

are the strongest wheels made. A bad skid against a curb might bend these wheels, but it could not break them, and even if bent, they could easily be straightened. The tremendous strength of these wheels insures your safety. In spite of their great strength, Parker-Hydraulic Pressed Steel Wheels weigh half as much as wooden wheels with demountable rims.

Other advantages of Parker-Hydraulic Pressed Steel Wheels are—They give you the easiest and quickest demountable rims, their handsome baked-on finish will not rust—they greatly decrease unsprung weight.

It will pay car manufacturers, dealers and motorists to investigate Parker-Hydraulic Pressed Steel Wheels.

Catalog on request.

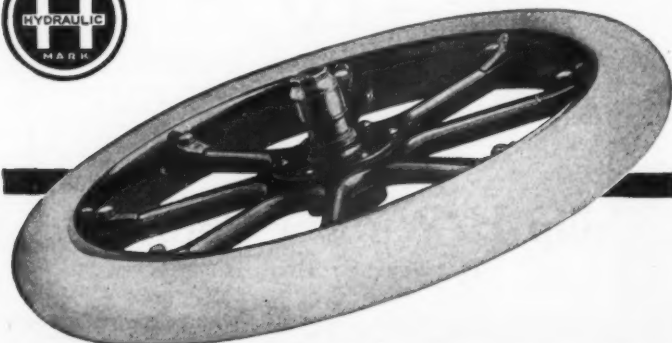
These wheels are manufactured under the Gibson Pat.

The Hydraulic Pressed Steel Company

3174 East 61st St.

Cleveland, U. S. A.

Builders of "Hydraulic" Pressed Steel Frames on Which Reliable Cars Are Built.



Please mention The Automobile when writing to Advertisers

Protect Your Car from Theft with a



K-W Autolock Switch
For Fords

\$3.50 Complete

It takes the place of the ordinary switch, and can be attached to any make coil in five minutes. Its operation is as simple as locking a door. Your key in your pocket is your assurance that you will find your car locked, right where you left it.

Without the key it is impossible to operate the switch. Removing the screws will not remove the lock, unless YOUR key is inserted. The K-W Autolock Switch is sold by reliable dealers everywhere at \$3.50. If yours is out, sent prepaid on receipt of price.



AUTOLOCK SWITCH



2833 CHESTEN AVE.

CLEVELAND, OHIO, U.S.A.

DIXIE 20TH CENTURY MAGNETO

No electrical lag—no coaxing and juggling with the spark lever—extra speed and added power instantly at command and not at the dictates of the engine—are three important advantages that magneto ignition has over any form of battery ignition, automatic or otherwise.



**SPLITDORF
Electrical Co.**
NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)

Mechanics

25% More Pay
One Week Vacation

Fifty expert automobile mechanics wanted. Will pay 25% more than current wages and give one week vacation (at full pay, yearly). Only married men, at present employed and with at least 3 years' experience, considered

C. T. Silver Motor Co.

57th Street and Broadway

NEW YORK



Ever since the world began

Quality

has been a predominating feature.
It is perhaps for this reason that

Bull Dog Quality

in
Rubberized Mohairs
and
Serges

is so satisfactory to both the manufacturer and the man who uses the car.

"A quality you want at the price you want to pay."

*Send for Samples
and Price List.*

L. J. MUTTY CO.
BOSTON, MASS.

Keystone Automobile Bodies For 1916

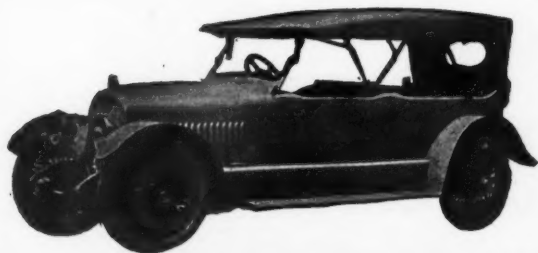
Individuality is as noticeable in motor cars as in homes. Our exclusive creations of motor car bodies are as perfect in design, finish and appointment as your own personality dictates.

We are among the oldest high grade carriage builders and are specialists on broughams, limousines, clover leaf and club roadsters.

There can be only one like yours.

Details on Request

Keystone Vehicle Company
Reading Pa.



Don't Let This Hole Get Bigger



Vul-Kit \$3.50

Fits any size Casing or Tube. Can be carried in the tool box.

Electric Model \$12.50

for home garage.

Tube-Kit \$2.00

Ford-Kit \$2.75

Seal up these small holes before sand and water work in and the tire blows out. It will save your tires—save you repair bills and triple your mileage.

SHALER Vulcanizer

The Shaler principle is so simple and the Shaler Vulcanizer so easy to use that any motorist can take care of and vulcanize his own tires without trouble in a few moments and make the repair the strongest part of the tire. The Shaler does not have to be watched or regulated. It has an automatic heat control which provides for the exact amount of heat for perfect vulcanization.

FREE to Car Owners Motorists, send for book, "Care & Repair of Tires." The tire information it contains will save you many a dollar. It explains everything about tires and how to care for them. Write today. It's **FREE**. Shaler Vulcanizers are sold by dealers everywhere.

C. A. SHALER COMPANY, 110 Fourth St., Waupun, Wisconsin

Canadian Distributors: John Millen & Son, Limited—Toronto, Winnipeg, Montreal, Vancouver
Largest Manufacturers of Vulcanizers in the World

This Is the Plug



These Are the Manufacturers Who Equip With

AC Spark Plugs

No Greater Recommendation Can Be Given a Spark Plug

Sold Everywhere

Packard	Buick	Enger	Knox
Pierce-Arrow	Oakland	Glide	Lambert
Cadillac	Oldsmobile	Lexington	Maxwell
Marion	Stearns	Howard	McLaughlin
Hudson	Knight	Austin	(Canada)
Chalmers	Saxon	Brockway	Monroe
Hupmobile	Stutz	Truck	Pilot
Chandler	National	Case Tractors	Sayers
Haynes	Velo	Chase Truck	Scovill
Chevrolet	Jackson	Daniels	Crane
Dort	Apperson	Empire	Simplex
Cole	Davis	Federal	Singer
Dodge	Detroit	G. M. C.	Stephens
Brothers	Paterson	Gramm	United Truck
Reo	Moon	Trucks	Wilcox Trux
Paige	McFarlan	Jeffery	Palmer Moore
Peerless	Westcott	Kiesel Kar	

Champion Ignition Co., Flint, Mich.

Have You
This Plug
On Your Car?

Important Announcement**Increase in Prices**

	Present List	New List	
Further Advance July 15, 1916.			
FORD UNIVERSAL WINDSHIELDS	\$10.00	\$13.00	10% off until July 15. After that date full list.
" CONOVER COWL WINDSHIELDS.	15.00	17.50	
COMMERCIAL COWL SHIELDS...	20.00	25.00	
FILLER BOARD SHIELDS.....	10.00	13.00	
TIRE SAVERS (SET FOUR).....	3.50	4.00	

Prices on Ford Saftsteer, Front radius rod brace, Rear Axle brace and Air Press Pump not increased.

The sharp increase in prices of all materials entering into the manufacture of windshields makes it necessary to increase our list prices. The large item of Plate Glass, of which we use only the best quality, is very high in price and very scarce. This country is now supplying the world with glass. Prices for materials have advanced 100 to 300 %. We shall maintain our high standard of materials and workmanship. Until July 15th we will allow a discount of 10 % on the above list prices, and after July 15th prices will be full list.

Page Woven Wire Fence Co.

Accessory Division

Dealers and Jobbers, write for discounts.

ADRIAN, MICH.

"FRACTO"

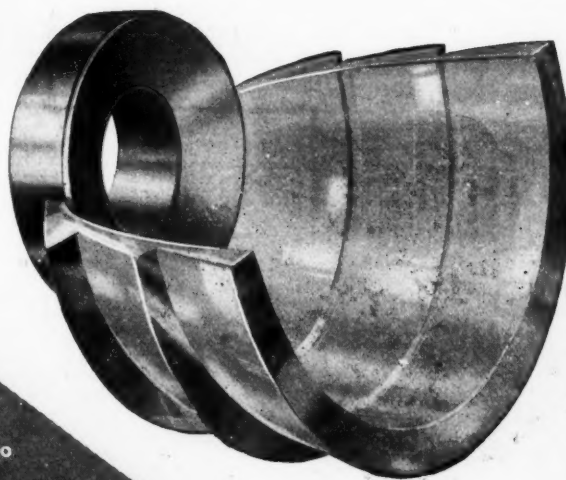
Comply with the law without losing the lighting value of your headlights — Equip your lamps with "Fracto."

\$2.75**PER PAIR**

"Fracto" equipped lamps show every depression, bump, stone and obstruction on the road-way long before you reach them. You get brilliant illumination without the glare which blinds, confuses and endangers approaching motorists and pedestrians.

"Fracto" is a little 2-oz. glass, cup-shaped lens which magnifies and intensifies the light of the bulb under which it is easily and simply attached. It governs the light rays and directs them along the road surface, giving better service than is possible to obtain from any light and ordinary reflector.

If your dealer can't supply you promptly, send direct to the manufacturer, enclosing price.


FRACTO SPECIALTY CO. 356 Newbury Street
BOSTON, MASS.

DYKE'S AUTOMOBILE AND GASOLINE ENGINE ENCYCLOPEDIA—\$3.00

FOURTH EDITION—SEVERAL ORDINARY BOOKS IN ONE—

The SIMPLIFIED Book on REPAIRING, TROUBLES, ELECTRIC SYSTEMS, Etc.

The instructions on electric starters, generators and lighting systems, not only deal with the principle and construction of all leading systems, but the methods for testing, such as testing for grounds, short circuits, testing the armature, fields, coils, etc., are thoroughly covered with simplified illustrations.

The Delco and all leading electric systems are thoroughly simplified.

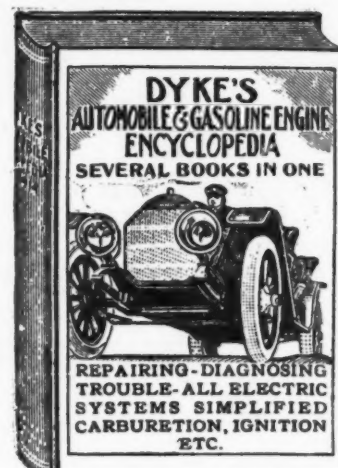
The storage battery is explained in detail; how it is constructed, different connections; how to charge; how to repair storage batteries—burning connections, overhauling, etc.

The repair subject is an ordinary book in itself—hundreds of illustrations simplify the text so anyone can understand at a glance. The repair subject is broad—it not only covers repairs, adjustments of every part of the car and engine, but such subjects as equipping a garage for home or business, overhauling cars from the ground up, increasing power of the engine, valve timing, ignition timing, adjusting and relining brakes, differentials, etc., etc.—every detail is simplified—also how to start into the auto repair business.

The 6, 8 and 12 cylinder engine instruction is simplified.

Lack of space prevents a lengthy description of this book. Order the book and see for yourself.

FREE WITH ENCYCLOPEDIA OR AUTO INSTRUCTOR—a Supplement on the detail of construction, principle, operation and care of PACKARD TWIN SIX—KING EIGHT—FORD. Fully illustrated and part printed in two colors.



Teacher, guide and reference on everything pertaining to motoring,—simple as the a, b, c's. —worth ten times its cost if only used as a reference. Nearly 1750 illustrations, 696 pages in all (large size 6x9). 49 instructions.

THEY ACTUALLY WORK BY HAND

DYKE'S 4 & 6 CYLINDER ENGINE MODELS

ALL MOVING PARTS REAL METAL

Size of 6 Cylinder Model, 11½x11 inches. 4 Cylinder Model, 9¼x11 inches.

At a glance you will learn—the name, purpose and principle of operation and relation of one part to another—firing orders, valve timing, etc.

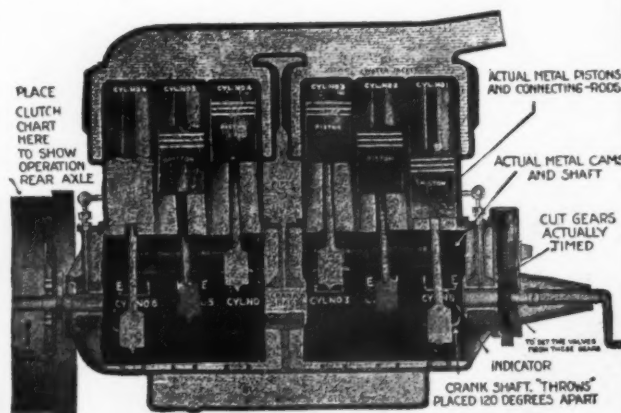
If you had a real engine before you—it would not give you the detail information you would obtain from the models—because you could not see the inside operation as you do with Dyke's Models. Each and every part is lettered and full instructions cover every detail.

For instance, when the starting crank is turned, the crank shaft gear turns the cam shaft gear which operates the cam shaft. The cam shaft with its eight or twelve cams are actually turned, and lift the valves at the proper time. As an example; the student can place piston in cylinder No. 1 on power stroke, then refer to chart alongside of engine and see just what all other valves, cams and pistons are doing.

In addition to learning all about the parts of an engine and their purpose; such subjects as valve timing, firing orders of 4, 6, 8 and 12 cylinder engines will be made perfectly clear. The "eight" and "twin six" engine principles can be easily understood with these models. The eight uses the same crank shaft as the four, and the twelve the same crank shaft as the six.

Another feature; with the four and six cylinder engine model, we send along charts of different parts, such as the clutch, gear box, drive shaft, rear axle, the electric starting motor, electric generator, a modern ignition system, inlet and exhaust manifold, etc. With these charts you can see just how they are applied to the regular engine.

Price of the 4-cylinder engine model (add 35c if to be prepaid)—\$2.50. Price of 6 cylinder model (add 38c to be prepaid)—\$3.00.



Crank Shaft, Piston and Connecting Rod side of the 6 Cylinder Engine Model. The opposite side is the valve side. The valves, cams, etc., actually operate and are accurately timed.

DYKE'S AUTO INSTRUCTOR

We combine, the 4 and 6 cylinder models and the Dyke's Auto Encyclopedia, and call this combination the Dyke Auto Instructor. Price \$8.50. This outfit will enable anyone to become a real expert.

You can learn quicker with the book described above and the models, than you can by actual practice, because, with the instruction, you start at the beginning and advance step by step and learn just what you ought to know. The models provide the actual practice. You can see the actual inside operation, something impossible to see with the real engine. The outfit is worth ten times its cost in actual commercial value to anyone who is not thoroughly posted—and you are your own teacher—during spare time.

A. L. Dyke is the originator of this new idea method of teaching by mail with working models, charts, manikins, etc. Mr. A. L. Dyke is a pioneer, he originated the first automobile supply business; published the first practical treatise on automobiles; (Dr. Dyke's Diseases of a Gasoline Automobile, 1900); manufactured and marketed the first float feed carburetor in America (1900). In addition he designed and built several early experimental automobiles—both gasoline and electric.

Address Book Dept., **THE AUTOMOBILE**, 239 W. 39th St., New York, N. Y.

The 1917 Model

Madison

Seven Passenger "Six"

\$1150

F. O. B.
ANDERSON,
INDIANA

—A remarkable example of moderate price combined with sterling quality, style and appearance. Unsurpassed by cars selling for \$1500 or over. The new Madison Six gives you luxury without extravagance.

Read these specifications—they tell the story.

Wheel base—124 inches.

Motor—Six cylinder Rutenber high speed type, 40 H. P.

L head; cast en bloc.

Starting, Lighting and Ignition—Remy.

Carburetor—Rayfield.

Axles—American Gear and Machine Co.'s pressed steel full floating rear, with Gurney annular bearings and Brown-Lipe noiseless nickel steel spiral cut gears, I-beam front.

Clutch—Muncie Gear Works, multiple disc, dry plate.

Gasoline Feed—Stewart-Warner vacuum system.

Wheels—34x4.

Rims—Stanweld demountable. One extra.

Tires—Goodyear 34x4. Non-skid on rear.

Springs—English Manganese double heat-treated steel. Front, semi-elliptic; rear, $\frac{3}{4}$ -elliptic, 56 inches long—underslung.

Upholstering—Genuine long grain, brilliant finished, machine buffed leather, stuffed with real hair.

Color—Richelieu Blue.

Top—One-man type covered with famous NEVERLEEK material, guaranteed.

Equipment—Electric horn, speedometer, ventilating rain vision windshield, tire carrier, foot and robe rails, tools, pump and jack.

Show cars of this new model Madison Six are now on the sales floors of our distributors.

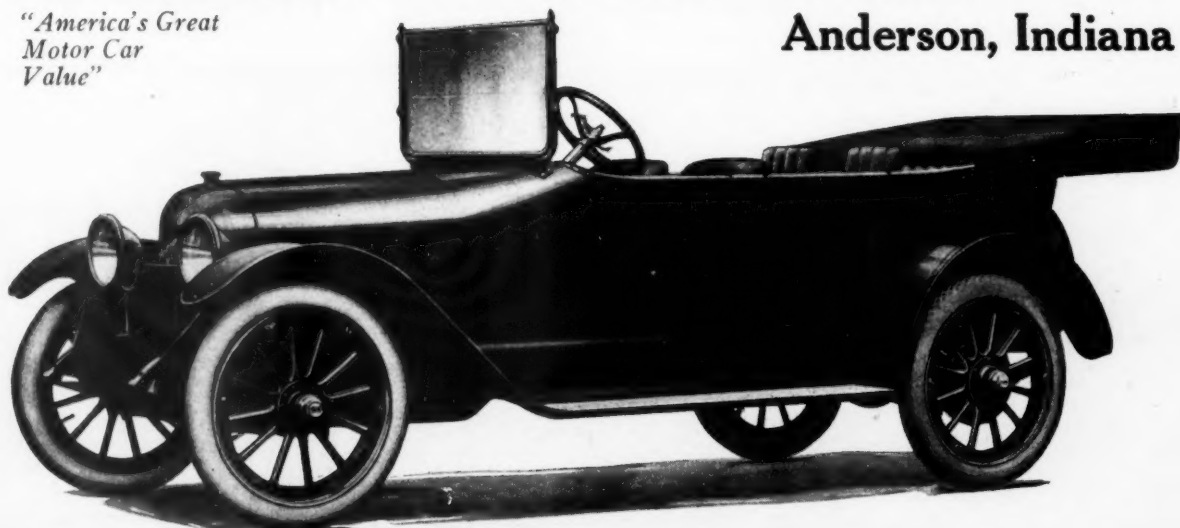
We require a few more distributors for the season of 1917. Get in touch with our sales department if you are in open territory, because every Madison dealer is **making good**.

Five Passenger Touring Car or Two Passenger Roadster—\$1050.

MADISON MOTORS COMPANY

"America's Great
Motor Car
Value"

Anderson, Indiana



Please mention The Automobile when writing to Advertisers

26 Extra
Features

Mitchell

MID-YEAR
MODEL

\$1325
F. o. b. Racine

John W. Bate's Surprise

To Motordom in general, this latest Mitchell came as a great surprise. And the place it has gained is amazing.

The efficiency which this car typifies has been a slow result. John W. Bate, the genius behind it, has done his work in quiet. And the facts you know now were never told until his work was done.

His 17th Model

The Mid-Year Mitchell is the 17th model built under Mr. Bate. It represents the result of 700 improvements.

The Mitchell factory is a John W. Bate creation. Its 2092 up-to-date machines are all of his design or selection. But this model plant, covering 45 acres, is a many-year development.

So what seems now a sudden result has been really a slow evolution.

The Right Basis

What we have aimed at is to get the right basis. We have aimed to build a high-grade car for less than anyone else could build it.

We now have the plant to do that. Here we build 98 per cent of the Mitchell under Bate efficiency methods. And no other plant in existence can build a similar car at our cost.

The result shows clearly in extra value. In a price below any other car of like size, grade and power.

And in 26 costly extras which other cars omit.

A Lifetime Car

But Mr. Bate's efficiency doesn't stop with that. He has stood for a lifetime car.

He insists on big margins of safety, on Chrome-Vanadium steel, and for oversize parts to meet strains.

The New Mitchell has hardly a casting. But 440 parts are either drop forged or stamped from toughened steel.

There are six Bate-built cars which have averaged 164,372 miles each, or over 30 years of ordinary service.

Extra Attractions

He has also stood for extra attractions. Before completing this Mid-Year Mitchell he had experts examine 257 Show models. Then he combined in this single car all the best of the new conceptions.

He has made the Mitchell the most complete car on exhibit. It has 26 features which rival cars lack.

Now we are making these facts known to every motor car buyer. This season alone we spend \$500,000 in national advertising.

The demand for the Mitchell has trebled in one year. And the facts behind it are just becoming known.

There are still many chances for dealers who deserve such an opportunity. And we want to hear from them.

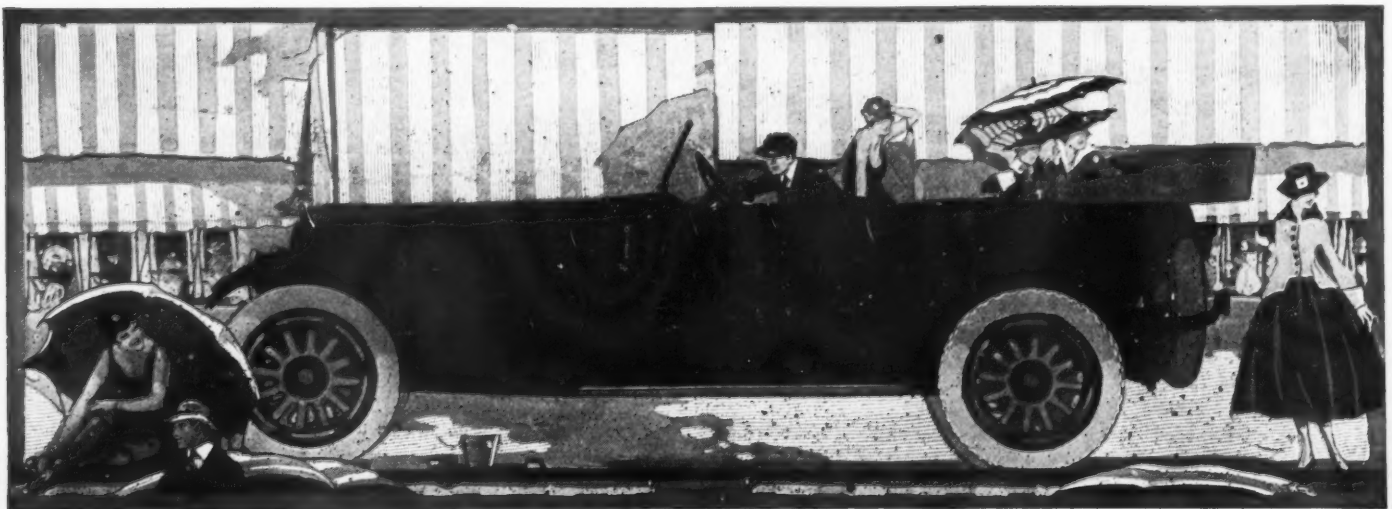
MITCHELL-LEWIS MOTOR CO.
Racine, Wis., U. S. A.

\$1325 F. o. b.
Racine

For 5-Passenger Touring Car or
3-Passenger Roadster

7-Passenger Touring Body \$35 Extra

High-speed economical Six. 48 horsepower; 127-inch wheelbase; complete equipment, including 26 extra features.



Please mention The Automobile when writing to Advertisers

*"New
Tops
for
Old"*



THOUSANDS of automobile owners all over the country who are using Johnson's Prepared Wax and Johnson's Cleaner with such wonderful results will be glad to know about our new product—

JOHNSON'S BLACK-LAC

It is unequalled for touching up **leather cushions—side curtains—tire covers—auto trunks—pantasote and mohair tops and linings.**

One coat of Johnson's Black-Lac gives a rich, black surface—just like new. It is easy to

apply—dries in fifteen minutes—does not rub off on the hands or clothing—is permanent—waterproof and inexpensive.

Do not hesitate to use Johnson's Black-Lac on the finest leather—it acts as a preservative and renders the leather soft and flexible.

For Worn Metal Parts

Johnson's Black-Lac is unequalled for blackening **fenders—rims—running boards—hoods—radiators—guards—lamps—and in fact all worn metal parts.** One coat covers. Prevents rust and keeps your car in a high state of repair.

It is no longer necessary to purchase three or four different products for dressing-up your car. Johnson's Black-Lac is six products in one:

- | | |
|---------------------------------|-----------------------------|
| 1—It is a mohair top dressing. | 4—It is a cushion dressing. |
| 2—It is a leather top dressing. | 5—It is a metal enamel. |
| 3—It is a lining dye. | 6—It is a rim paint. |

Use **Johnson's Cleaner** and **Prepared Wax** to keep the body, hood and fenders shining like new. Be sure to ask for

JOHNSON'S—"They make old cars. New motor stars."



For Sale by Garages and Accessory Dealers

S. C. JOHNSON & SON, Racine, Wis.

A7

I am interested in Johnson's Black-Lac—please send me complete information and advise where I can purchase it.

NAME.....

ADDRESS.....

CITY & STATE.....

MY DEALER IS.....



The "Fountain of Youth" For Your Tires

DON'T neglect the small cuts and punctures. Your tires will have a new lease of life if you give them immediate attention with

Firestone Accessories

Take Firestone Cementless Tube Patches—for example. They are so easy to put on, are full of "give" and stick indefinitely.

Other helps in the line are Firestone Hook-On or Lace-On Boot, Inside Blowout Patch, Cure Cut, etc. Get complete list from any dealer.

Dealers: Our proposition helps you serve the public and makes money for you. Write

Firestone Tire and Rubber Company

*"America's Largest Exclusive
Tire and Rim Makers"*

Akron, Ohio

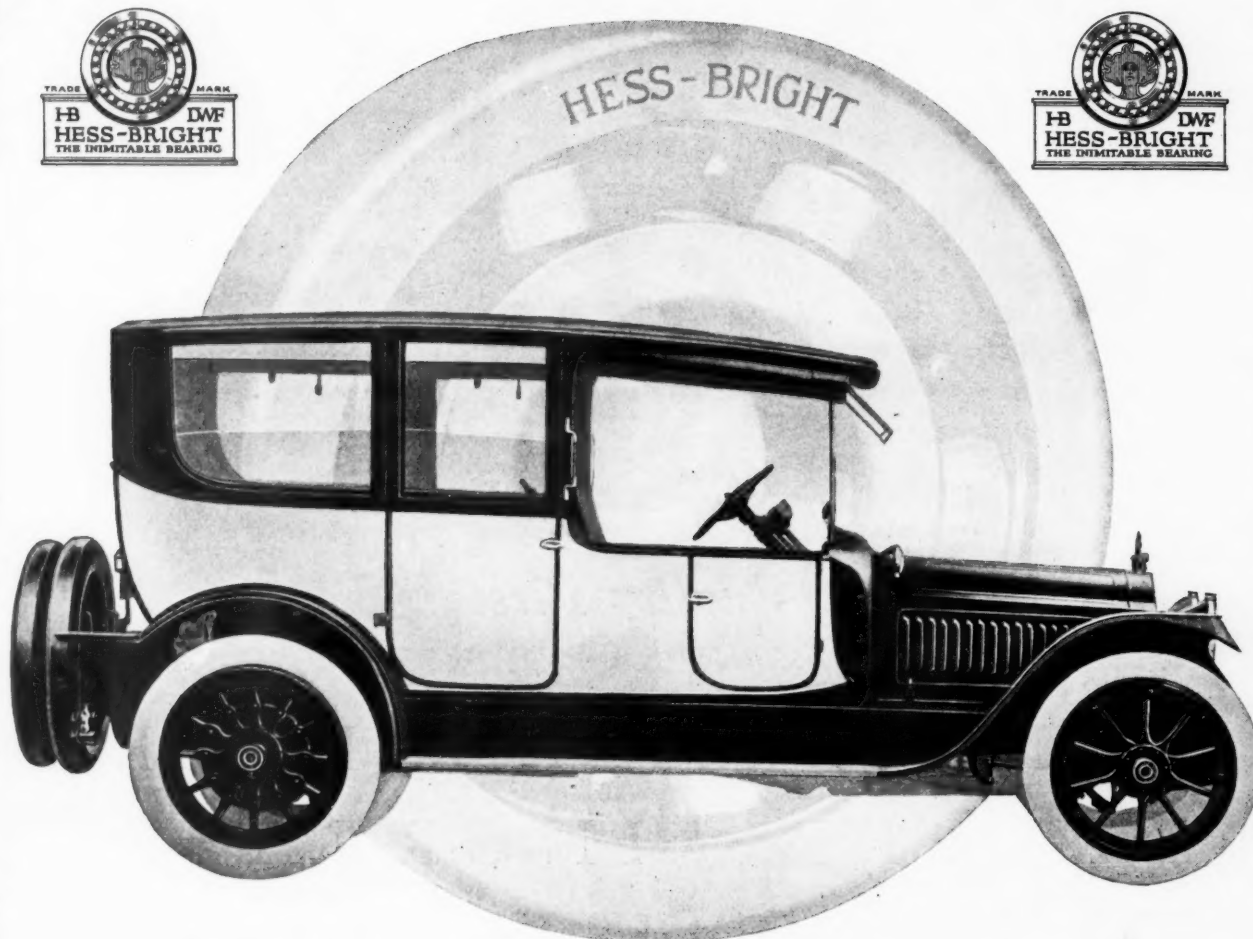
Branches and Dealers Everywhere

Firestone Cementless Tube Patch Free

Easy to put on; sure to stay tight. To prove the success of Firestone patches we will send one free to any car owner or dealer. Ask for Book "Mileage Talks."



Please mention The Automobile when writing to Advertisers



HESS-BRIGHT BALL BEARINGS

are a quality product exclusively — the first cost is high.

It is but natural, then, that the manufacturers of one of America's finest automobiles, who insist upon the best, should prefer to use them.

THE HESS-BRIGHT MANUFACTURING CO.
PHILADELPHIA, PA.

HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED



Quality First

NUMBER OF CHALMERS
DEALERS INCREASES
308.2% IN TWELVE MONTHS

On June 1, 1916, there were 1433 Chalmers dealers of record as against 351 on the corresponding date last year.

This shows a net increase of 1080 Chalmers dealers or 308.2% in twelve months.

The Big Point in Any Car!

Cuts Gasoline Cost!

WHAT have you been doing toward reducing your gasoline expense? What are you going to do?

A lot of you car owners have calmly accepted the tremendous rise in gasoline cost, made a few complaints, then let it go at that.

You think gasoline expense cannot be reduced. But it CAN! It IS being reduced!

Since the rise in gasoline prices the sales of the New Stromberg Carburetor have taken phenomenal leaps. Because thousands of car owners realized that the New Stromberg is one absolutely sure way to reduce gasoline consumption.

They have watched it make new world's economy records during the past few years on all kinds of cars in all sorts of tests.

We will send you records to prove that the New Stromberg is positively the world's Economy King. Then figure out the amount of gasoline it will save you and you'll find it a mighty profitable investment for you. It is certainly worth your while investing a few dollars now to save many dollars.

There have been numerous investigations into the high price of gasoline, but no real action. The only consumers who got results were those who were wise enough to install the New Stromberg Carburetor.

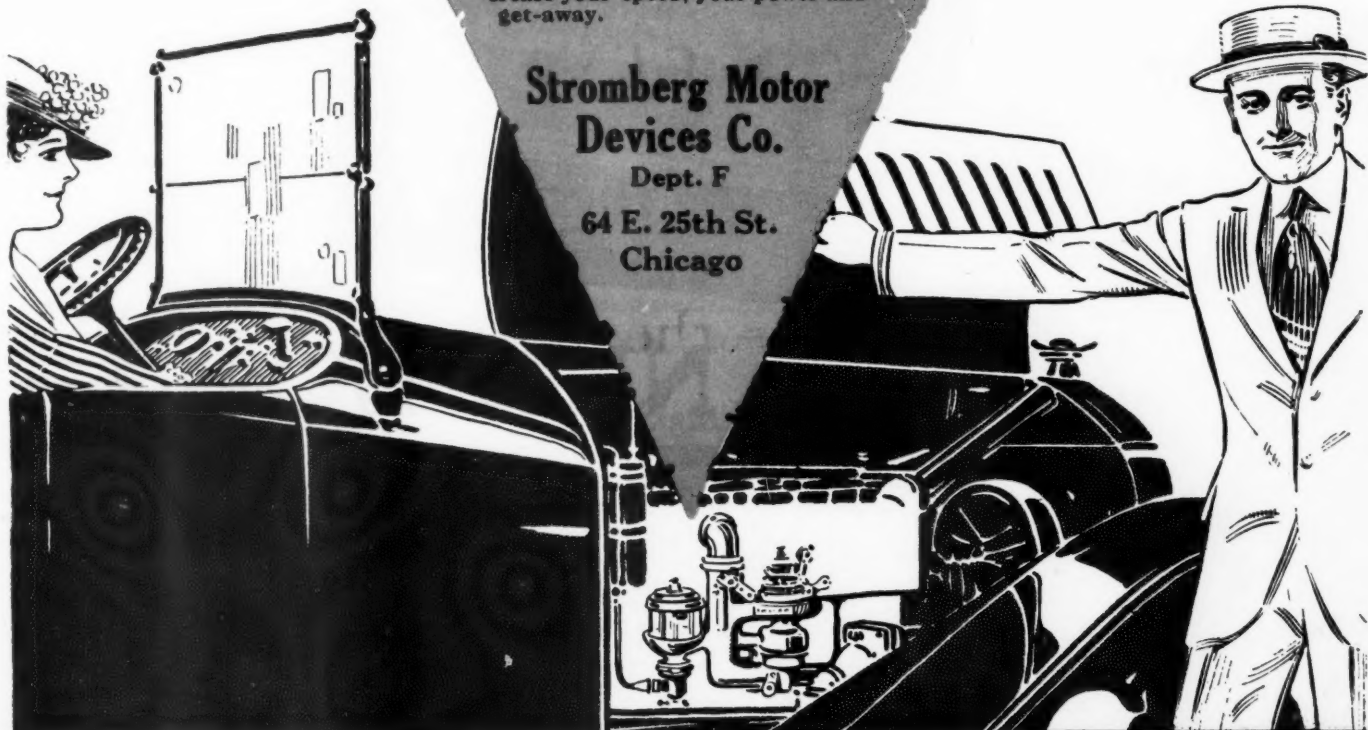
Gasoline prices will not come down. So why wait longer for some one to help you? Help yourself! You are wasting real money every day you delay equipping your car with the New Stromberg Carburetor.

Send name, model and year of your car now and we'll prove how the New Stromberg will save you money, increase your speed, your power and get-away.

**Stromberg Motor
Devices Co.**

Dept. F

64 E. 25th St.
Chicago



New STROMBERG Does it!
CARBURETOR

Please mention The Automobile when writing to Advertisers



A NEW BOOK

—in handy size, that will enable you to find and repair your starting and lighting troubles.

Keep it in your car, for ready reference.

It will save you time and repair bills.

Size 5 x 8 inches—36 pages.

Two bindings:

Flexible leather—75 cents

Heavy cardboard—50 cents

Book Department

THE AUTOMOBILE

239 W. 39th Street

New York

Please mention The Automobile when writing to Advertisers

Elgin Six

"CLASS"

The ELGIN SIX has grace and beauty of design that instantly appeals to the most exacting. The racy, yacht-line body and the full five-passenger roominess make it a car of character and distinction.

The mechanical construction throughout is of the highest standard—from the powerful 35 H.P. Six Cylinder valve-in-head motor, down to the smallest detail.

The ELGIN SIX performs like a thoroughbred under the most adverse conditions. It has abundant power and speed. It has perfect balance. Its riding qualities are unexcelled. Its average is twenty to twenty-five miles to the gallon of gasoline.



Dealers Will Appreciate These High-Grade Features

Six - Cylinder Valve - in - Head
35 H. P. Motor.

Unit Power Plant. Three-Point
Suspension.

V - Type Radiator. Thermo-
Syphon Cooling.

Combination Force Feed
and Splash Lubrication.

Two-Unit Dyneto Electric
Starting and Lighting System.

Delco Ignition System.

Rayfield Carburetor. Stewart
Vacuum Feed.

Three-Quarter Floating Rear
Axle. 12 1/2" Brake Drum.

Springs, Semi - Elliptic Front,
Self-Oiling Cantilever Rear.

Multiple Disc, Dry Plate Clutch
—Steel on Raybestos.

True Yacht-Line Body. Con-
cealed Hinges and Door
Locks.

Deep Upholstering on Resilient
Springs.

One Man Top — Jiffy Curtains.

Heavy Stamped Crown

Fenders.

Quick Detachable and De-
mountable Rims.

32" x 3 1/2" Black Tread Tires.

Non-Skid Rear.

114" Wheel Base. Standard
Tread. Clearance 10".

Price \$845 f. o. b. Factory.

There is still some desirable territory open for
responsible dealers. Write or wire us today.

Clover Leaf Roadster

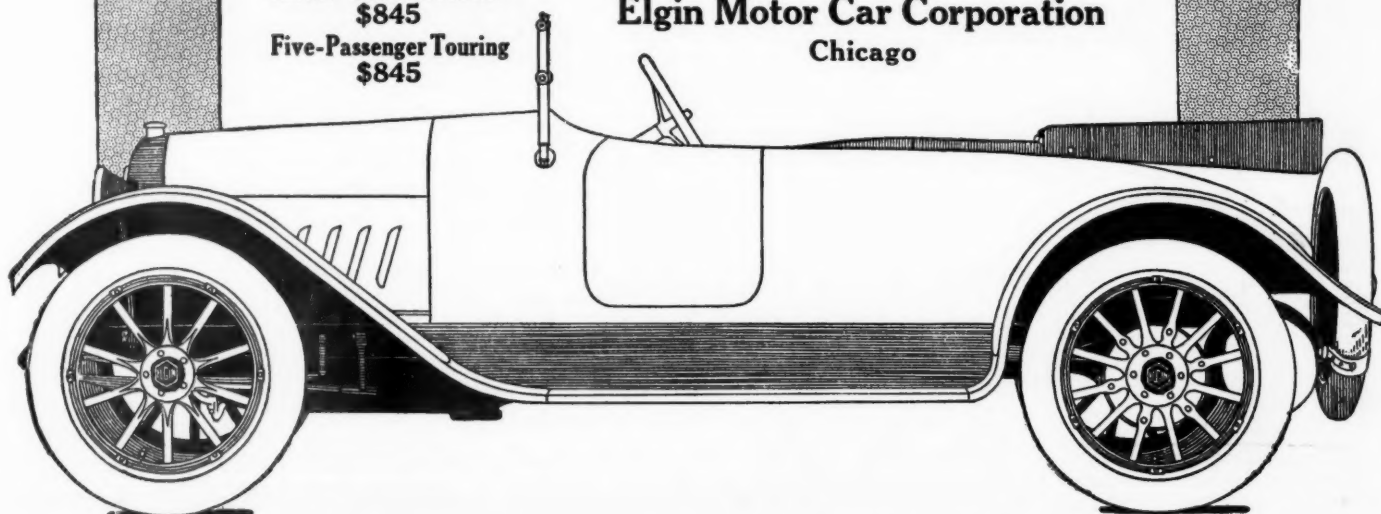
\$845

Five-Passenger Touring

\$845

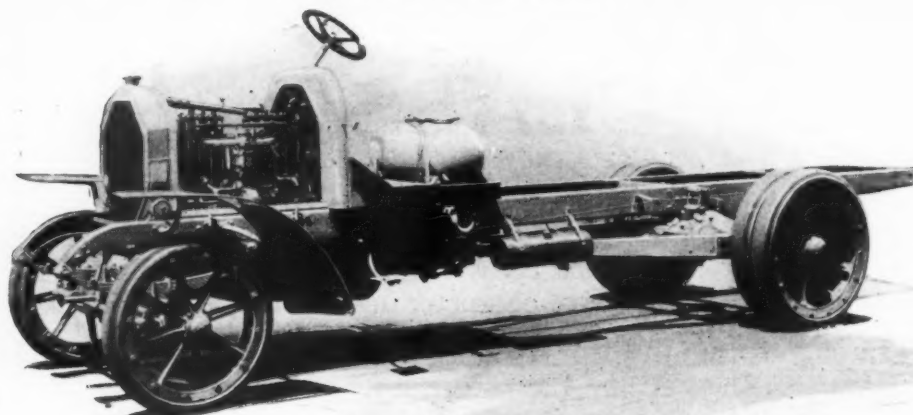
Elgin Motor Car Corporation

Chicago



Please mention The Automobile when writing to Advertisers

HERE IS THE
"JASCO TANK" MOUNTED



"JASCO TANK"

IS USED ON General Vehicle Trucks



The "Jasco" Tank is used and indorsed by the following prominent manufacturers:

PLEASURE CARS

Biddle Motor Car Company, Simplex Automobile Company, Mercer Automobile Company, Lozier Motor Company, Stanley Motor Carriage Company, James Cunningham Son & Company, Murray Motor Car Co.

TRUCKS

Baldwin Locomotive Works, Autocar Company, General Vehicle Company, H. G. Burford Company, Peerless Motor Car Company, Garford Motor Truck Co., Gramm Motor Truck Co.

MOTOR BOATS AND NAVAL ARCHITECTS

William H. Hand, Jr., Mathis Yacht Building Company, Gas Engine & Power Company.

The makers of this truck—whose name has been synonymous with Automobile quality for many years—equip their product with the "Jasco" Tank because:—

They have thoroughly investigated and tested it, and they *know* positively that it will consistently "stand up" in service; never springing a leak under the most severe conditions; they believe it is the tank most worthy of being presented to General Vehicle customers on the product of that company.

Have you looked into the important question of fuel receptacles? Do you recognize the value of a tank that protects every drop of your gasoline, saving it from leakage, fire or explosion? The "Jasco" Tank is seamless, tinned and tested; it is made of the finest quality drawn steel and it positively cannot leak.

Look carefully at that car you intend purchasing—if you find a "Jasco" Tank as part of the standard equipment you'll know beyond question that the manufacturer is building his product on a consistent quality basis.

JANNEY, STEINMETZ & CO.

Main Office: PHILADELPHIA

New York Office: Hudson Terminal Building

WITH THE POSSIBLE EXCEPTION OF ONE OR TWO POPULAR CAR AGENCIES THE "CARSPRING" EXCLUSIVE DISTRIBUTOR PROPOSITION OFFERS YOU GREATER PROFITS THAN ANY AUTOMOBILE OR ACCESSORY IN ALL MOTORDOM.



A strong statement in view of the fact that over one hundred tire manufacturers are burning the midnight oil to perfect their sales organizations.

Maybe it is presumptuous on our part to match our conservative production (500 Carsprings every twenty-four hours) against the big two and three thousand per day manufacturers, but it is just this difference that places the Carspring Distributor miles in front of the usual tire dealer.

Carspring Dealer profits are just as positive as the market for new tires, and the Carspring demand is continually increasing in proportion to our production at the rate of 100% every month.

We did not create a new sales plan to merchandise "CARSPRINGS." On the contrary, we continued our fifty-year-old policy of allotting exclusive territory to one good distributor and protecting each distributor to the extent of guaranteeing a liberal profit on every sale from his territory.

Far beyond the immediate "profit point" we enter into a permanent arrangement that will continue uninterruptedly for many years. You can appoint your own sub-agents and you can deal with your customers on a factory branch adjustment basis that offers you sufficient latitude to maintain a healthy, profitable and pleasant business.

Under this sales plan a comparatively limited number of Distributors handle our entire production, and in direct co-operation with our Distributors we confine our publicity to each individual territory.

IN A FEW WORDS

—the best tire that fifty years' rubber experience and unlimited capital can produce.

—a liberal working agreement and a permanent territorial arrangement protecting your profits for years to come.

—concentration of selling co-operation and publicity in Distributor's Territory.

—absolute and unbounded belief in our distributors and authority to appoint sub-dealers and control their business.

We repeat—Carspring Distributors have an unmatched profit opportunity. One good Distributor in each territory—will you qualify?

New Jersey Carspring & Rubber Co.
Jersey City, N. J.



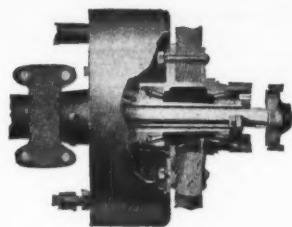
Whatever else you take on your tour, there is *one* thing indispensable to make it a real vacation of fun—one thing that will contribute to the daily enjoyment of everyone—and that is a stock of Columbia Records, with a

COLUMBIA GRAFONOLA

There are Columbia Grafonolas priced \$15 to \$50 that are splendid substitutes for your larger instrument on a tour or camping trip. Portable, compact, easy to stow anywhere in the car. Any Columbia dealer near you will be glad to show them and play them for you. Be sure to see about one *today*.

New Columbia Records on sale the 20th of every month

Please mention The Automobile when writing to Advertisers



Removable Axle Shafts drive the wheels. One-piece nickel steel Axle Tubes support *entire* weight of car. Hub is of *steel*; Driving Clutch is quickly removable and of *nickel steel*.

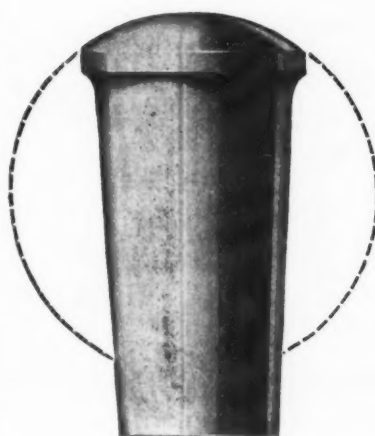
**Five Features
of Superiority found only in
The Full-Floating**

American Axle

**Equipped with Spiral Bevel Gears
and Bock Taper Roller Bearings**



The Spider carrying small differential pinions is free to float—equalizing all strains in the differential.

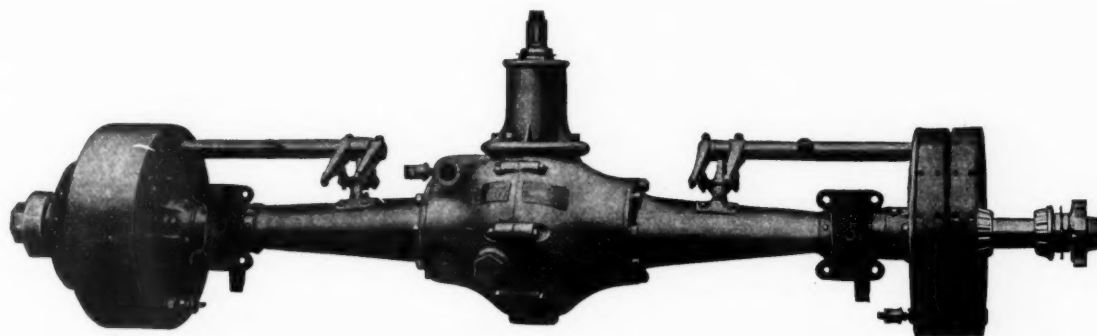
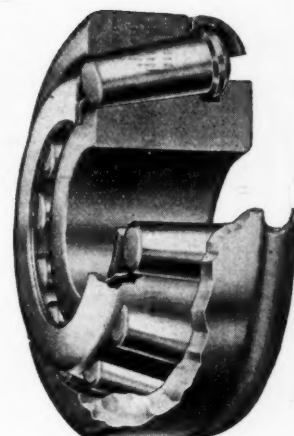


Note the Ball-Shaped Head

The design of this roller differs from all others in that it has a ball-shaped head which takes the end thrust like a ball thrust bearing, and without the slippage and friction so destructive to other taper roller bearing assemblies.

This design also relieves the tapered roll of having to withstand the jamming caused by end thrust.

Furthermore, the rolls, cones and races of the Bock Bearing are made—not of ordinary carbon steel—but of the finest alloy steels obtainable, giving tremendous strength and wear-resisting qualities.

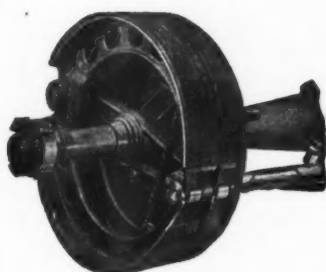


Licensed under The Kardo Company Patents

The American Ball-Bearing Co.

Pioneer Axle Builders of America

Cleveland, Ohio



The Twin Internal Brakes do not grab, but exert a brake action always in direct ratio to effort exerted by driver.



Axle Tubes support *entire* weight of car. They are of *one-piece* construction and made of $3\frac{1}{2}\%$ nickel steel for strength and safety.



The New 1917 Models

Last spring we adopted the double-cowled body on the Moon Six-44. So quickly did it find favor with both dealers and owners, that we have selected this design for the new 1917 models—the Six-66 and the Six-43. In addition to this feature, the 1917 body design (Delauney-Belleville type) exhibits still further refinement. Speed and power are expressed by its long, straight lines—and this impression is heightened by the smart, slanting windshield.

(We venture a prediction: So well has this design been received by the public that we believe by the end of 1917 every car of any moment will have followed our lead in the adoption of this double-cowled body.)

Moon 1917 models will challenge attention and admiration in any company and under any conditions.

But we have not stopped with the improvement of the body design. You will see in this further list of the principal 1917 features many other reasons for Moon desirableness.

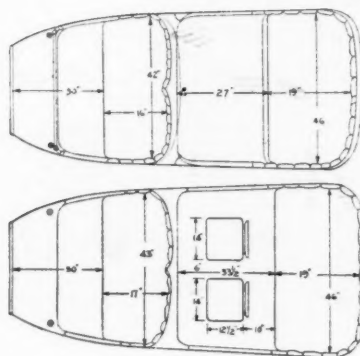
Six-43

Actual Brake Horsepower

AND

Six-66

Actual Brake Horsepower



MOTOR—New Continental-Moon high-speed efficiency type, developing, in the Six-66, full 66 horsepower (actual brake test). The Six-43 develops 43 horsepower (actual brake test). In each case tremendous power in proportion to its weight.

STARTING, ETC.—New two-unit Delco-Moon starting, lighting and ignition system. Bendix automatic drive in connection with starting motor.

UPHOLSTERY—Genuine tan Spanish leather, adding both to the beauty and the comfort of the car.

BODY—Delauney-Belleville type, with double cowl and slanting windshield. Big and roomy (Moon cars have always been noted for their roominess in both front and rear compartments). The seats are especially designed to *fit and rest the body*. The Six-43 body is not quite so long as the Six-66, as space is not needed for the extra seats.

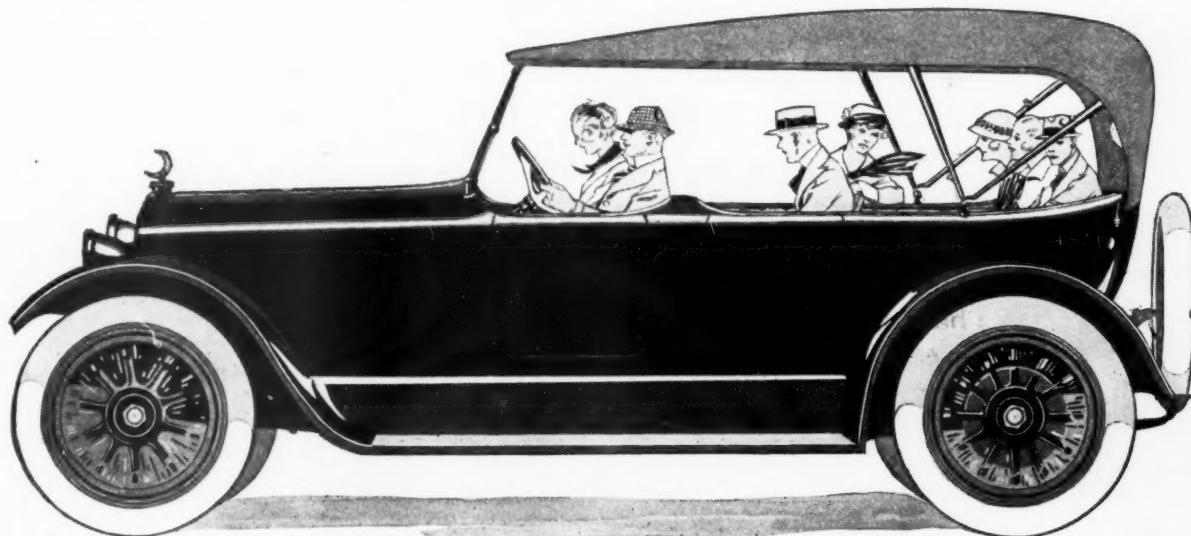
REAR AXLE—Of course the spiral gear *noiseless* rear axle.

WHEELBASE—On the Six-66, 125 inches; and on the Six-43, 118 inches. It will be readily seen from this that these are *big sixes*—as big or bigger than many other sixes selling \$500 to \$600 more.

PRICE—Six-66, seven passenger, fully equipped, \$1575; Six-43, five passenger, fully equipped, \$1250.

MOON MOTOR CAR COMPANY,

St. Louis, Mo.





"The World's Best Carburetor"

In a contest recently appearing in "*Horseless Age*," asking for the name of the World's Best Carburetor, 430 replies were received.

Of this number 300 contestants selected for this honor

RAYFIELD

CARBURETORS

Owners who equip their cars with Rayfields solve the problem of high fuel cost; for a saving of 10 to 50 per cent is guaranteed in every instance; a *fact* with which dealers are familiar—a *reason* why dealers substitute Rayfields on demonstrators originally equipped with other carburetors.

Car owners will enjoy reading our book, "A Spoonful of Sugar." Ask us for a copy.

A dealer in Tacoma states that the Rayfield installed on his four-cylinder demonstrator increased his mileage from 12 to 20, and on his six-cylinder the increase was from 10 to 18 miles per gallon. The dealer also states that the Rayfield added wonderful flexibility and power. A private owner says: "twice as much mileage out of my gasoline, and no carbon trouble."

Absolute satisfaction or you money back. Order thru any dealer

Findeisen & Kropf Mfg. Company

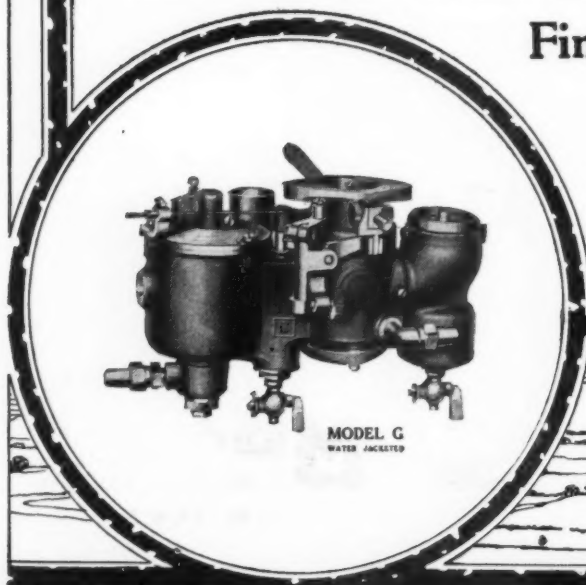
2117 Rockwell Street, Chicago

BRANCHES:

1140 Michigan Avenue
CHICAGO

1902 Broadway
NEW YORK

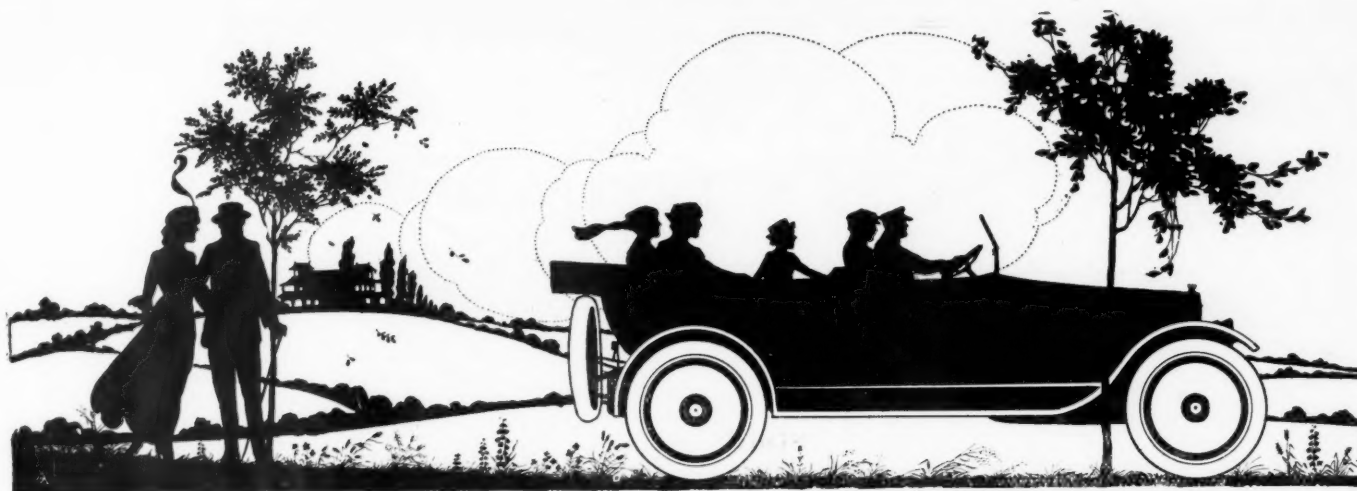
1191 Woodward Avenue
DETROIT



MODEL G
WATER JACKETED



Please mention The Automobile when writing to Advertisers



IN THE PARK WITH THE CHANDLER SIX

BOSCH

**MAGNETOS ARE MADE TO FULFILL
A SERVICE—NOT TO MEET A PRICE**

THAT in a nutshell is the reason for the wonderful success of Bosch Magnetos, the reason why more than Two Million Bosch Magnetos are in use today, the reason you should insist that a Bosch Magneto be on the motor car you sell, if an agent, or buy, if an owner.

Not "How Reasonable" nor "How Cheap," but "How Good" is the watchword at the Bosch Works. It is your guarantee that your Bosch Magneto will serve faithfully and efficiently without asking for a minute of your time for adjustments or replacements or for battery attention.

Look at any Bosch Magneto, inside and out, compare its material and workmanship with any other ignition device you may have considered—the decision as to Bosch Superiority is left with you.

BE SATISFIED The motor car you buy or sell can be Bosch-Equipt—insist. **SPECIFY BOSCH**

Service stations in every state.

Correspondence invited.

BOSCH MAGNETO COMPANY

220 WEST 46th STREET

NEW YORK CITY



Please mention The Automobile when writing to Advertisers

KISSELKAR

Hundred Point Six

\$1095



The Stampede to the *Hundred Point Six*

A RUSH of buyers followed the announcement of Kissel's Ultimatum to the automobile world. They instantly recognized that here was a new standard of value by which all other cars will be judged.

Car buyers everywhere were forcibly impressed with the Hundred Quality Features in Kissel's great *Hundred Point Six*.

Have your KisselKar dealer explain the Hundred Quality Features—compare them—and order early for immediate delivery.

The ALL-YEAR Car

Kissel originated the "two-in-one" idea—the one perfected removable top by which others acknowledge leadership by imitation. The new ALL-YEAR models for the *Hundred Point Six* chassis are way ahead of anything attempted before, showing what the originator can do to maintain his leadership. Don't fail to see them.

DEALERS—Car buyers in uncoupled territory want Kissel's *Hundred Point Six* and ALL-YEAR Cars. It means ALL-YEAR motoring for KisselKar owners and ALL-YEAR business for KisselKar dealers. Write us today.

KISSEL MOTOR CAR CO., Hartford, Wisconsin, U. S. A.

Please mention *The Automobile* when writing to Advertisers



Regal-4-thirty-two

This Regal Has the Most Rugged Chassis Ever Built for a Light Car



\$695

¶ 32 h.p. High Speed Motor, Bore $3\frac{1}{2}$ ", Stroke $4\frac{3}{4}$ ". Has detachable head and three bearing Crank-Shaft. 4 point suspension. Motors built in our own Shops.

¶ Two unit Starting and Ignition System. Magneto type. Starter motor engages fly wheel through Bendix Drive.

¶ Extra deep frame with wide side members furnish great strength and maximum support to chassis. Cantilever Springs, shackled at both ends, directly under frame, make Regal one of the easiest riding cars on the market. Brakes equalized—external contracting and internal expanding.

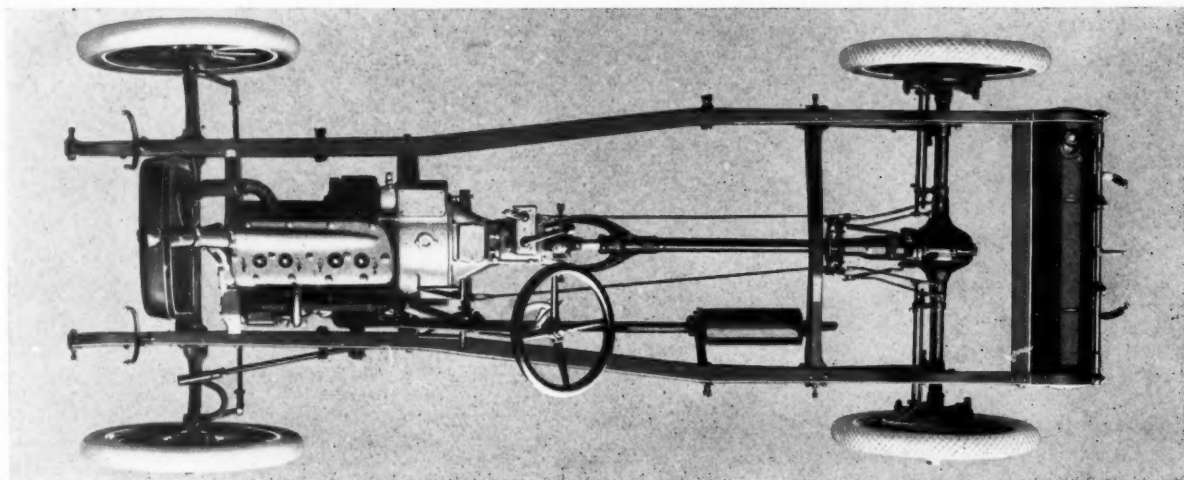
¶ Full floating rear axle. This allows the weight of the car to rest entirely on the axle housing. Front axle, I-Beam, drop forging.

¶ Gasoline tank at rear. 14 gallons. Vacuum feed to Motor.

¶ Add these features to the cruiser type of body design of the Regal 4 Thirty-two, and you have a motor vehicle that will make instant appeal to your prospects.

¶ Complete information as to dealer possibilities and illustrated catalogue on request.

REGAL MOTOR CAR CO. (Dept. C) DETROIT, MICH.





To supply a definite need —with definite finality

Where the family purse cannot afford a big, expensive car—

Where the family pride cannot afford an unsightly, little, uncomfortable car—

There the \$615 Overland supplies a definite need with definite finality.

Here is the small, comfortable car—a beauty—complete to the last detail—inexpensive—economical—another and greater Overland success.

And its price—\$615—is far below any former price for any completely equipped automobile—regardless of appearance or comfort considerations.

As you look the car over and read its specifications,

you realize its absolute completeness.

But you must ride in it to appreciate its comfort.

You must drive it to get the thrill its performance will give you.

You can own one of these cars.

But act promptly—for naturally no car was ever in such demand.

No other car at anywhere near its price can compare with this one for beauty, performance, comfort, completeness and economy.

Get in touch with the Overland dealer today—now.

The Willys-Overland Company, Toledo, Ohio

"Made in U. S. A."



